Heating Piping & Air Conditioning

DESIGN
INSTALLATION
OPERATION
MAINTENANCE

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INDUSTRIAL
COMMERCIAL
INSTITUTIONAL AND
PUBLIC BUILDINGS

Page 157—Journal Section of The American Society of Heating and Ventilating Engineers

JANUARY 1952

DIRECTORY NUMBER

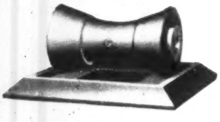
. . . . see the yellow pages

ADJUSTABLE PIPE HANGERS AND SUPPORTS

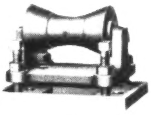
for every piping requirement

NO. 3 OF A SERIES
SHOWING
THE GRINNELL LINE

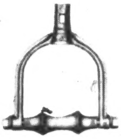
pipe rolls



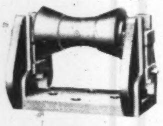
Pipe Roll and Plate
Fig. 277
2 to 30 in. pipe



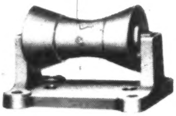
Adj. Pipe Roll with Base
Fig. 274
Without base: Fig. 275
2 to 30 in. pipe



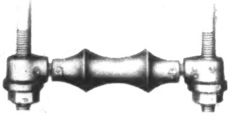
Adj. Swivel Pipe Roll
Fig. 174
2½ to 12 in. pipe



Adj. Pipe Roll
Fig. 276
4 to 30 in. pipe

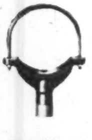


Pipe Roll Complete
Fig. 271
2 to 30 in. pipe

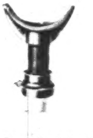


Single Pipe Roll
Fig. 171
1 to 30 in. pipe

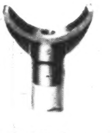
pipe saddles



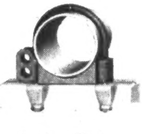
Pipe Stanchion Saddle
Fig. 259
4 to 36 in. pipe



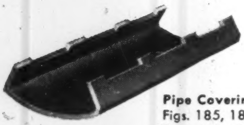
Adj. Pipe Saddle Support
Fig. 264
2½ to 36 in. pipe



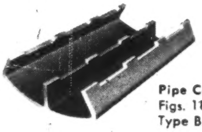
Pipe Saddle Support
Fig. 258
4 to 36 in. pipe



Anchor Chair
Fig. 197
4 to 24 in. pipe



Pipe Covering Protection Saddle
Figs. 185, 186, 187, 188
Type A for 10 in. and smaller



Pipe Covering Protection Saddle
Figs. 185, 186, 187, 188
Type B for 12 in. and larger

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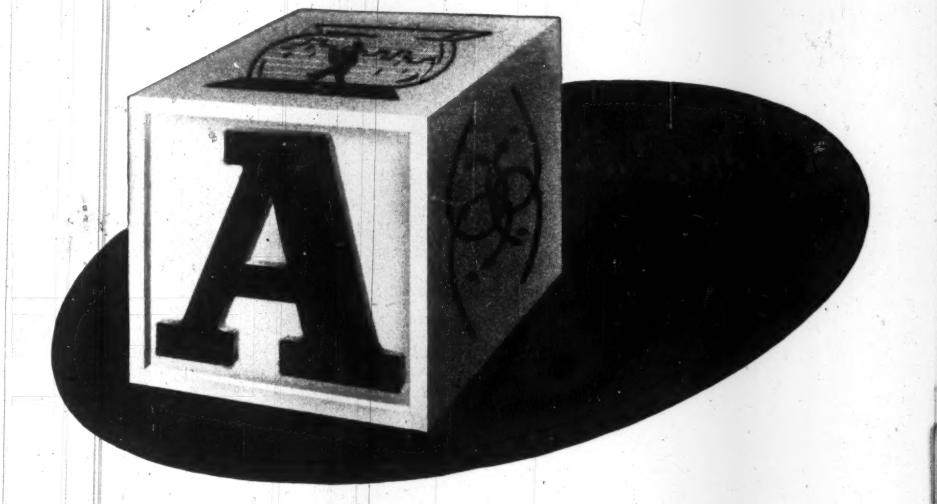
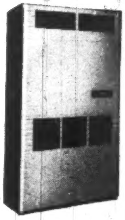


"a" is for "air" . . . basic to all



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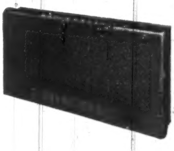

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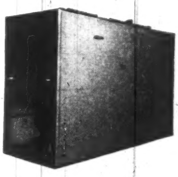

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usAIRco

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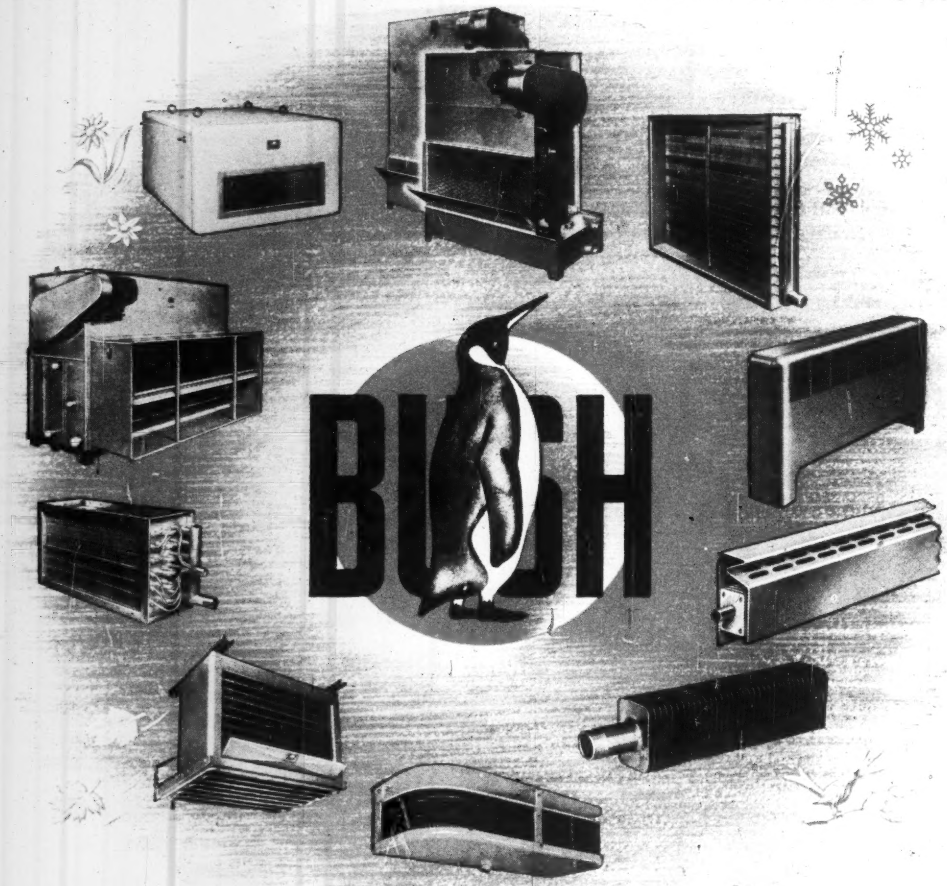

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Heating Piping & Air Conditioning

Vol. 24, No. 1

(with which is merged the Aerologist)

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JANUARY 1952

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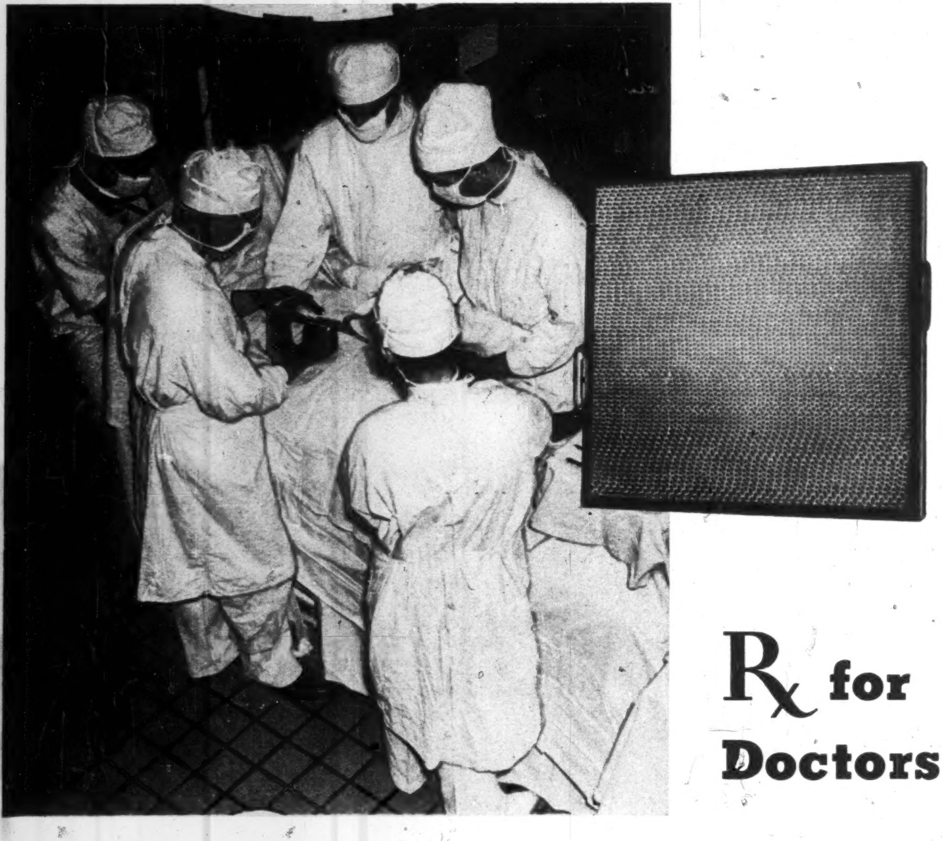

℞ for Doctors

RECENTLY the maintenance engineer of a large hospital experienced a serious case of filter cloggitus. He was having no end of trouble in continuing to supply fresh air to the laboratories. He thought Far-Air* filters might correct the difficulty but hesitated to prescribe them without previous experience with this filter, as the staff of doctors would be highly critical if there were any noticeable decrease in filtering efficiency.

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FARR COMPANY *Manufacturing Engineers*

Los Angeles • Chicago • New York

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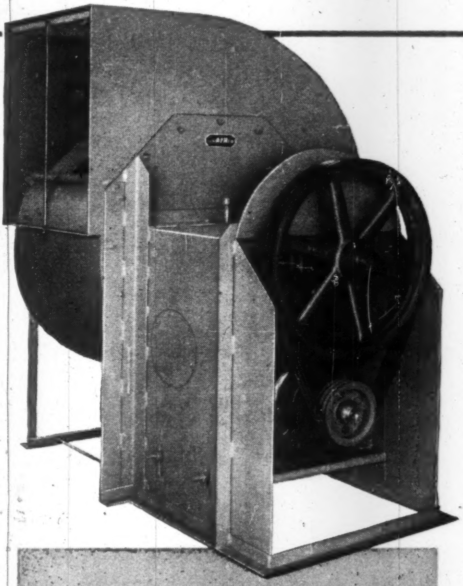
In our 30 years in business, we have established a record for quality V-belts. That is why we can *guarantee* the life of every Durkee-Atwood V-Belt! Write for complete details—or ask your nearest Durkee-Atwood distributor.



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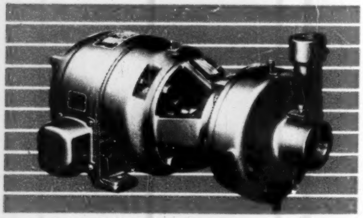

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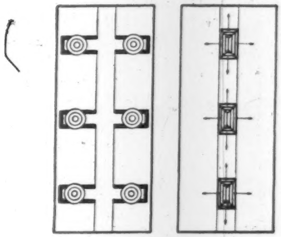

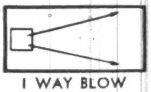

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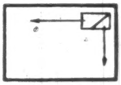

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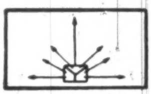

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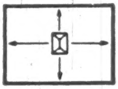

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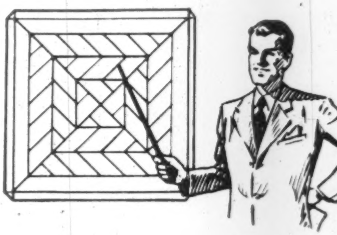

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...a size and type for every purpose

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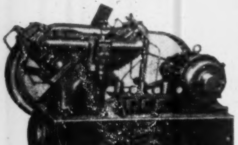

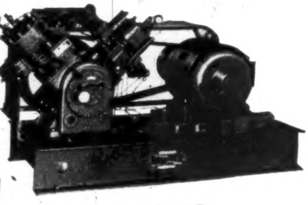

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AIR CONDITIONING

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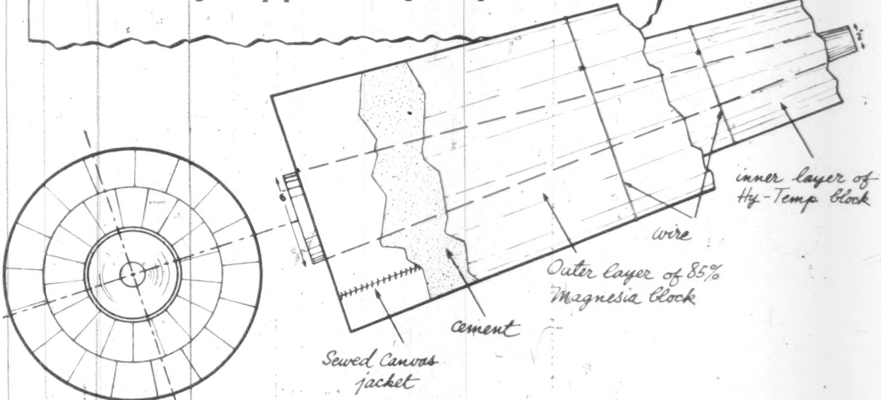
Remote Installation Types from 3 to 75 HP.

WE HAVE BEEN ASKED:

"How would you insulate a tapered reducer where regular pipe covering is impractical?"


6"
inner layer of Hy-Temp block
wire
Outer layer of 85% Magnesia block
cement
Sewed Canvas jacket

A power engineer wrote to us recently and outlined this problem: "We plan to insulate a 6" x 2" x 30" tapered reducer which carries steam at 350 lbs. pressure (725 F.) between a pressure reducing valve on a 2" superheated steam line (1000 F.) and a de-superheater. What insulating materials do you recommend and how should they be applied?"

To answer this question, we sent the drawing above and the following recommendation: To minimize heat loss on the 2" superheated steam line, regular pipe coverings of Hy-Temp and 85% Magnesia should be used. These are applied in two 2" layers according to standard specifications for this 1000 F. temperature. On the tapered reducer, the same insulation thickness is used. Here, however, blocks of insulation are applied instead of preformed pipe covering. These must be cut and carefully fitted around the conical shape, then wired securely in place. The layer of Hy-Temp is applied first. This reduces the temperature on its outer surface to a point within the 600 F. temperature limit of the 85% Magnesia, which is then applied to further cut down heat loss. As is the case with the layers of pipe covering, inner and outer joints should be staggered to prevent through joints that result in heat leakage. Joints should be filled in and smoothed with cement. A sewed canvas jacket completes the job.

The next time you have any insulation work to be done, you'll find that Armstrong's thorough knowledge of insulation and its uses can help you. Our Contracting Service can handle the entire job for you—furnish fine-quality materials and the skilled workmen to apply them properly. For further information, just contact your nearest Armstrong office.

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FOR ALL TEMPERATURES FROM 300°F. BELOW ZERO TO 2800°F.

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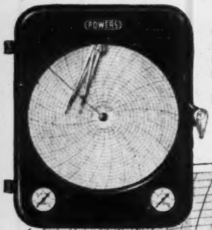
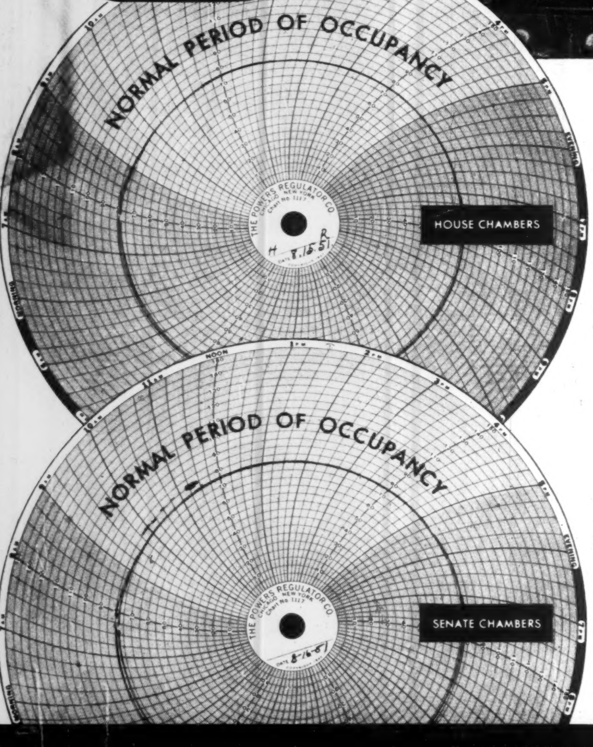
Right: Joint session of the Congress in the recently remodeled House of Representatives—listening to "State of the Union" address by the President.

In the historic House and Senate Chambers as well as the administrative offices in the Capitol, heating and air conditioning systems are regulated by a Powers system of pneumatic control.



Only a few of the many types of Powers Control used in the Capitol are shown here.

Left: Powers Two-pen Recording Controller.



World's Largest and Most Comfortable Legislative Hall is Regulated by—

POWERS AIR CONDITIONING CONTROL

◀ **Note Accurate Control in House and Senate Chambers**

Outdoor temperatures, during the period covered by the temperature charts varied between 75 and 95° F., yet indoor temperature was maintained constant from 9 A. M. to 5 P. M. One temperature sensitive bulb is located near the speaker's rostrum, another is in the gallery. Note separate lines during the off period of control and how the two lines merge into one when Chambers were occupied.

THE POWERS REGULATOR CO.

3400 OAKTON ST., SKOKIE, ILLINOIS • Offices in Over 50 Cities

Chicago 13, Ill., 3819 N. Ashland Ave. • New York 17, N. Y., 231 E. 46th Street
Los Angeles 5, Cal., 1808 West 8th Street • Toronto, Ontario, 195 Spadina Ave.
Mexico, D. F., Apartado 63 Bis. • Honolulu 3, H. I., P. O. 2755—450 Piikoi at Kona

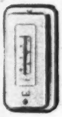
Over 60 Years of Automatic Temperature and Humidity Control

★

Architect
David Lynn

Consulting Engineer for Air Conditioning
Charles S. Leopold

Contractor
Mehring & Hanson Co.

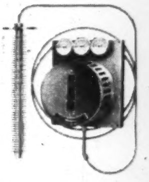


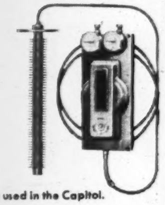
Powers Room Type Thermostat

Other Washington Buildings using POWERS Control

Department of Agriculture and Post Office Department Bldgs., Department of Interior and Old House of Representatives Office Bldgs., Social Security R. R. Retirement Bldg., Apex Bldg., Lafayette Bldg., U. S. Navy Hydrographic Bldg., Washington National Airport.

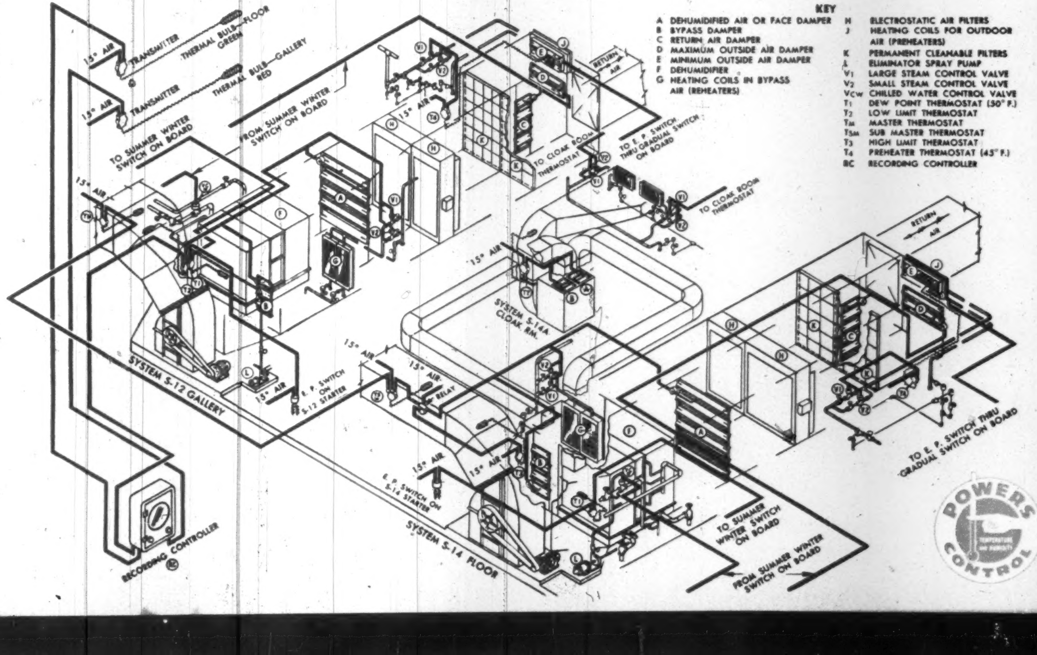
Experience gained by Powers in supplying dependable temperature and humidity regulation for these buildings may be helpful to you. When your problems involve precise control for heating or air conditioning, contact Powers nearest office . . . in over 50 cities.





Powers Remote Bulb Thermostats for Dew Point, Low and High Limit, Preheater, Master and Sub-Master Control
—only a few of the many controls used in the Capitol.

AIR CONDITIONING APPARATUS DIAGRAM FOR OPERATION AND MAINTENANCE OF SYSTEMS IN THE HOUSE AND SENATE CHAMBERS
Courtesy of Charles S. Leopold



KEY

A	DEHUMIDIFIED AIR OR FACE DAMPER	H	ELECTROSTATIC AIR FILTERS
B	BYPASS DAMPER	J	HEATING COILS FOR OUTDOOR AIR (PREHEATERS)
C	RETURN AIR DAMPER	K	PERMANENT CLEANABLE FILTERS
D	MAXIMUM OUTSIDE AIR DAMPER	L	ELIMINATOR SPRAY PUMP
E	MINIMUM OUTSIDE AIR DAMPER	V_1	LARGE STEAM CONTROL VALVE
F	DEHUMIDIFIER	V_2	SMALL STEAM CONTROL VALVE
G	HEATING COILS IN BYPASS AIR (REHEATERS)	V_{CW}	CHILLED WATER CONTROL VALVE
		T_1	DEW POINT THERMOSTAT (50° F.)
		T_2	LOW LIMIT THERMOSTAT
		T_M	MASTER THERMOSTAT
		T_{SM}	SUB MASTER THERMOSTAT
		T_3	HIGH LIMIT THERMOSTAT
		T_4	PREHEATER THERMOSTAT (45° F.)
		RC	RECORDING CONTROLLER

15° AIR
TRANSMITTER
THERMAL BULB—FLOOR GREEN
15° AIR
TRANSMITTER
THERMAL BULB—GALLERY RED
TO SUMMER WINTER SWITCH ON BOARD
FROM SUMMER WINTER SWITCH ON BOARD
15° AIR
RETURN AIR
TO CLOAK ROOM THERMOSTAT
TO E. P. SWITCH THRU GRADUAL SWITCH ON BOARD
TO CLOAK ROOM THERMOSTAT
15° AIR
SYSTEM S-14A CLOAK RM.
RETURN AIR
SYSTEM S-12 GALLERY
15° AIR
E. P. SWITCH ON S-12 STARTER
15° AIR
15° AIR
RELAY
15° AIR
15° AIR
E. P. SWITCH ON S-14 STARTER
SYSTEM S-14 FLOOR
TO SUMMER WINTER SWITCH ON BOARD
FROM SUMMER WINTER SWITCH ON BOARD
TO E. P. SWITCH THRU GRADUAL SWITCH ON BOARD
RECORDING CONTROLLER
RC
POWERS
CONTROL

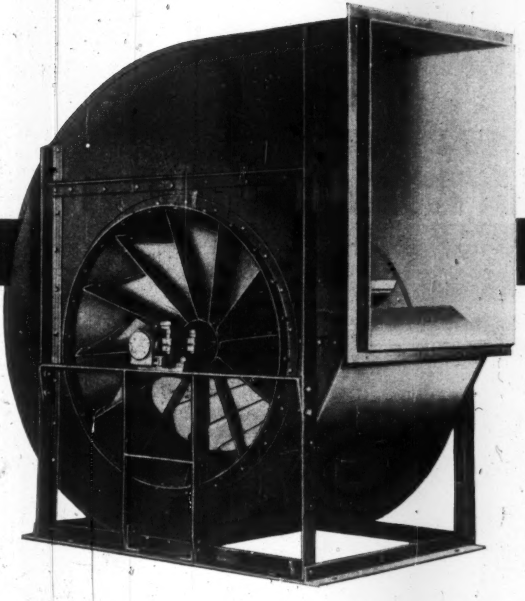
ANOTHER FAMOUS BUILDING

"Buffalo" AIR CONDITIONING EQUIPMENT

BEST & CO.
Architects:
Shreve, Lamb
& Harmon, NYC
Heating, Venti-
lating and Air
Conditioning
Engineer:
Edward E. Ashley
NYC
Contractor:
Almirall & [illegible]
NYC

BEST & CO
BEST & CO
BEST & CO.
BEST & CO

Right, "Buffalo" Limit Load Fan, most recommended for large ventilation jobs. Write for Bulletin 3737.



A fine example of modern commercial America is the outstanding 5th Avenue, New York, store of Best & Co., world-famous apparel store.

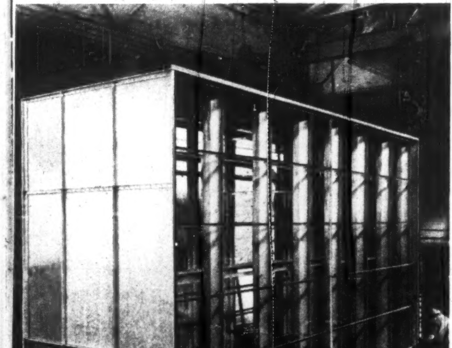
The forward-looking management of this store overlooked no detail in planning for the comfort of customers and employees. Small wonder "Buffalo" Fans and Air Conditioning Units were chosen — their reputation for long life, dependable and economical service has been proven for many years.

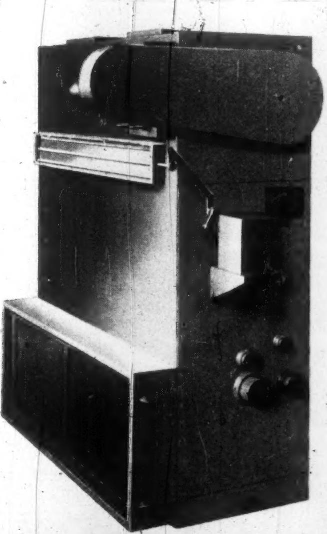
And comfort is just ONE of the important jobs being done by "Buffalo" Air Equipment! . . . Its value in defense, for instance, was established in many ways during World War II. Let us show you how many of your problems can be solved or controlled by "Buffalo" Air Equipment!

BUFFALO FORGE COMPANY

171 MORTIMER STREET BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities.





Combined features that distinguish Foster Wheeler package steam generators

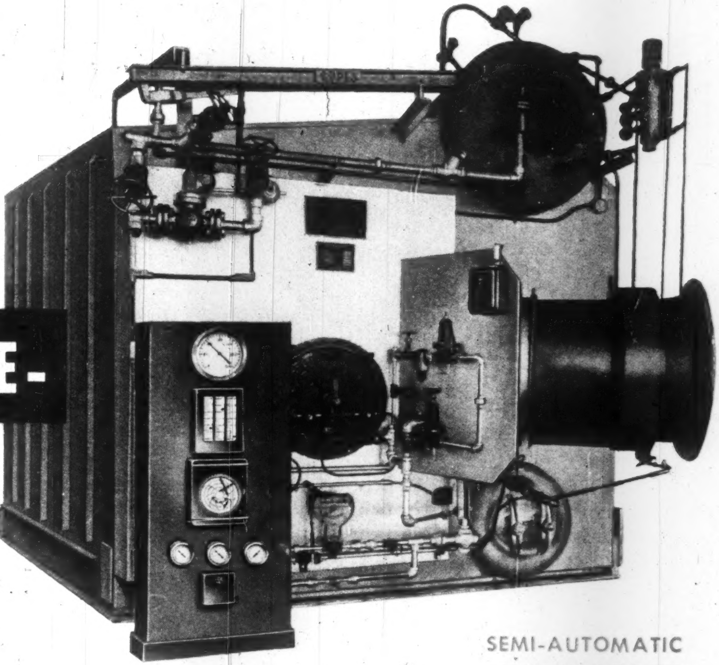
WATER TUBE DESIGN	Vertical tubes, . . . steady water level, closely spaced waterwall tubes on 3½" centers
FACTORY ASSEMBLED STEAM PLANT	Compact, self-contained steam generating units
WIDE RANGE OF CAPACITIES	7,500 to 30,000 lb per hr . . . flexible multi-unit installations for greater capacities
HIGH STEAM TEMPERATURES	Provisions for superheaters in some designs
PORTABILITY	May be transported by common carrier . . . minimizes problems of initial installation and plant relocation
EXPERIENCE	50 years' design, engineering, manufacturing of power plant equipment behind each Foster Wheeler unit
EASILY INSTALLED	Simple foundations . . . few service connections
OUTDOOR INSTALLATION	Rugged, steel encased construction
ACCESSIBILITY	For inspection, . . . cleaning, maintenance
COMBUSTION CONTROLS	Fully or semi-automatic controls for single or multi-unit installations
CONTROL VALVES	Equipped with 3-valve by-passes
CLEAN HEATING SURFACES	Soot blowers incorporated . . . cleaning without boiler shutdown
HEAT LOSS MINIMIZED	Minimum heat loss—from radiation and air infiltration
RAPID LOAD SWINGS	Large diameter drums and ample furnace heating surface

all for the price

FULLY AUTOMATIC

push-button start • operation at all pressures up to design pressure

of a PACKAGE -



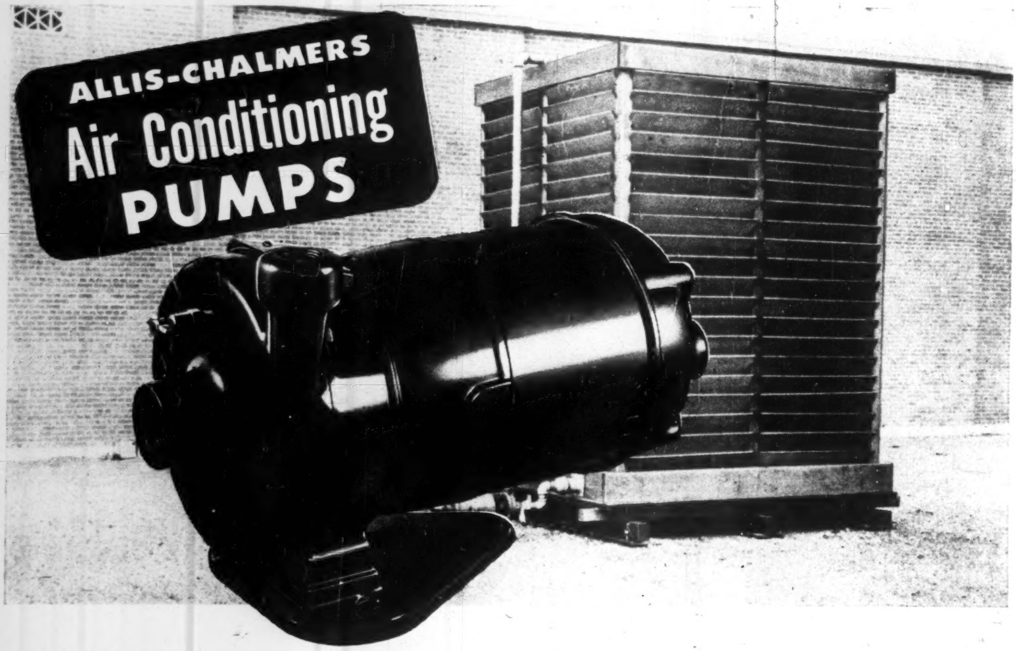
SEMI-AUTOMATIC

manual ignition • wide operating range • modulating control

When faced with the need for a reliable and economic source of steam for your plant, look for these marks of quality and efficiency—water-tube design, generous proportions, electronic controls—notable attributes of the Foster Wheeler Package Steam Generator available in capacities from 10,000 to 30,000 lb of steam per hr. • Write for CATALOG PG-51-2.

FOSTER WHEELER CORPORATION, 165 BROADWAY, NEW YORK 6, N. Y.

FOSTER FW WHEELER



We Help You SOLVE Your PUMP PROBLEMS

ONE OF THE BIG PROBLEMS in air conditioning work is engineering the circulating system. Even though you may know how to do it, it's a place where Allis-Chalmers engineers can save you time and effort.

They will help you work out problems like these:

- **How big a pipe will I need?**
- **How big a pump will I need?**
- **Where's the best place for the pump?**

All in all, you are assured of a perfectly engineered job! As for the installation itself, that is the simplest part of an air conditioning job when Allis-Chalmers circulating pumps are used. All it takes is three mounting bolts, a few pipe fittings, two wires and the silent, smooth-running pump is installed. No maintenance problems either!

Try Allis-Chalmers on your next job. You'll find the pumps can't be beat; prices are in line; and service is fast and good. Call your nearby Allis-Chalmers district office, or write, Allis-Chalmers, Milwaukee 1, Wisconsin.

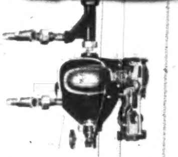
A-3572

5 FEATURES
of Allis-Chalmers Package Pumps

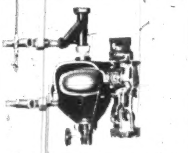
1. Standard Motor — These fractional horsepower pumps are built with NEMA standard motors of a well-known brand. Built-in thermal protection provided.
2. Mechanical Seal is used rather than the usual packing gland. Mechanical seal doesn't leak and requires no regular maintenance.
3. Closed Impeller is accurately die cast of special bronze. Impeller has smooth surface and high hydraulic efficiency. It is carefully machined and balanced for quiet operation. Impeller can easily be removed with screwdriver and Allen-type wrench.
4. Rotatable Casing — Discharge may be placed in any of four directions.
5. Easy Installation — Motor and pump are a single complete unit which is simply bolted in place. No extra parts to buy.

ALLIS-CHALMERS

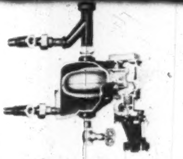
A-C ALLIS-CHALMERS



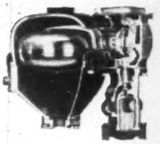
No. 47 Boiler Water Feeder for hand-fired steam heating boilers up to 5000 sq. ft.



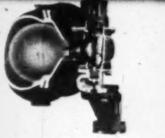
No. 47-2 Feeder - Cut - off Combination for automatically fired steam heating boilers up to 5000 sq. ft.



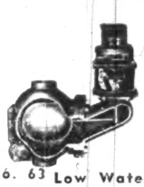
No. 147 Boiler Water Feeder Similar to No. 47, but with higher feeding level for process steam boilers.



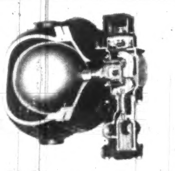
No. 247 Same as No. 47, but for installation with 1" equalizing pipes.



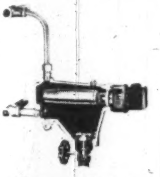
No. 53-2 Feeder Cut-off Combination — Similar to No. 51-2, but built for higher pressure, up to 75 lbs..



No. 63 Low Water Fuel Cut-off for water or steam boilers up to 50 lbs. pressure.

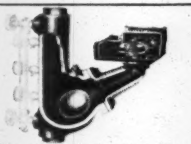


No 51-2 Feeder - Cut - off Combination for automatically fired steam heating boilers over 5000 sq. ft.



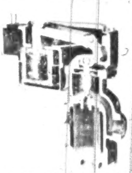
No. 67 Low Water Fuel Cut-off — for low pressure steam boilers of any size.

No. 150 High Pressure Pump Control, Cut-off and Alarm — for steam boilers of any size up to 150 lbs. pressure.



No. 157 Water Column Type High Pressure Pump Control, Cut-off and Alarm — for steam boilers of any size up to 150 lbs. pressure.

You should know ALL of these McDONNELL PRODUCTS

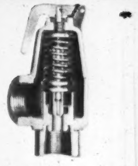


No. 101 Electric Water Feeder — operated by No. 67 or liquid level switches.

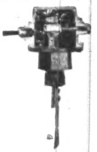
• You are probably familiar with the more commonly used McDonnell Products. But for those jobs you may run across from time to time that call for special equipment, you should be familiar with *all* the McDonnell liquid level controls, flow switches, and similar products listed here. They are all evidence of how intensively McDonnell has worked at "DOING ONE THING WELL." We will be glad to give you information and counsel on any special application that may arise.

McDONNELL & MILLER, INC., 3500 N. Spaulding Ave., Chicago 18, Ill.

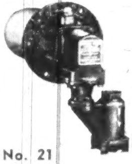
Doing One M&M SAFETY CONTROLS *Thing Well*



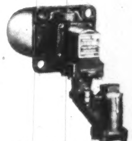
No. 33 Safety Relief Valve — for hot water heating boilers. Btu. rated. ASME standard.



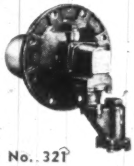
No. E-2 Flow Switch — Completes (or breaks) circuit when flow starts or stops.



No. 21



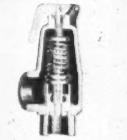
No. 121



No. 321

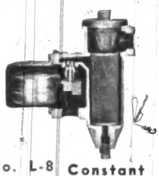
No. 27

Make-up Water Feeders—to maintain adequate water supply in receiving tanks. Nos. 21, 121 and 321 are installed right in tank openings; available in various flange forms and sizes as shown to fit existing openings. No. 27 is for external application, with equalizing piping.

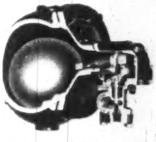


No. 3345-150 Safety Relief Valves — for hot water tanks and heaters. Btu. rated, ASME standard.

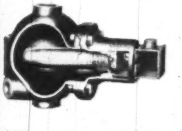
No. 18 Float Valve—for maintaining water level in humidifier pans and many other liquid level control jobs. Also available in float chamber with cover, as No. 518



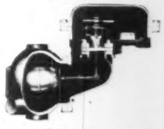
No. L-8 Constant Level Valve — Maintains constant fuel oil pressure on burner.



No. 355 Large Capacity Float Valve — Has many uses on tanks, stills, receivers, etc.



No. 61 Low Water Fuel Cut-Off — for 1" equalizing pipe installation on low pressure steam boilers.



No. 65 Explosion-proof Electric Controller — Underwriters' approved for hazardous locations.

No. 333 Safety Relief Valve Assembly —for larger hot water heating boilers. Btu. rated. ASME standard.

No. 154 High Pressure Pump Control — Similar to No. 150, but with open contact switches.

No. 69 "Built-in" Low Water Cut-off — Typical of many "built-ins" for installation in tappings provided in modern boilers.

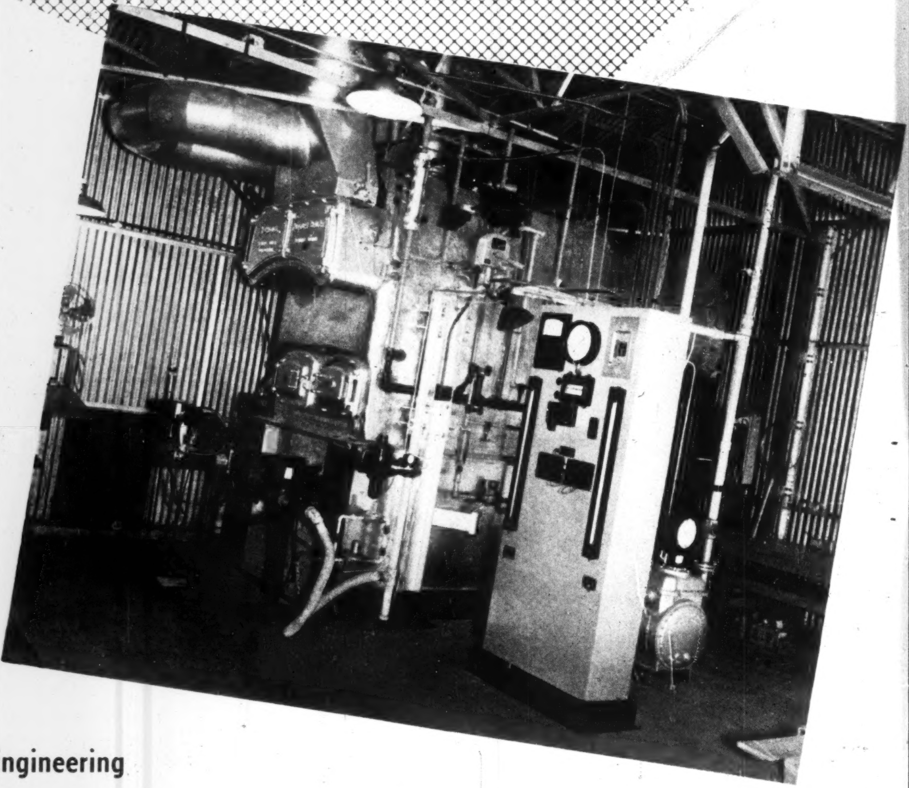
No. 767 Low Water Fuel Cut-off — (with No. 14 blow-off) for easy installation into opening in boiler.

No. 80 Switch — Three wire high- or low-level alarm or pump control on oil storage tanks.

No. 6667 Conversion Head — for converting former cut-offs into two-switch types.

No. 201 Temperature Relief Valve—for hot water tanks and heaters. A.G.A. tested, rated and listed.

WEBSTER COMBUSTION RESEARCH



Research and Engineering Make the Difference . . . .

The cooperation of these organizations in establishing the laboratory is gratefully acknowledged.

Kewanee Boiler Corporation
Minneapolis-Honeywell Regulator Company
Fisher Governor Company
McDonnell & Miller, Inc.
Hays Corporation
Royall Fire Brick and Supply Company
Oklahoma Natural Gas Company

With the new facilities pictured here, which are exclusively devoted to fact finding, WEBSTER is able to determine with complete accuracy the operating characteristics and efficiency of fuel burning and automatic control equipment.

Capable of handling gas or oil under complete instrumentation, this laboratory is adding immeasurably to the already well known "Engineered by WEBSTER" combustion and control equipment.

Webster's Sales and Service Organization provides competent combustion engineering on a nationwide scale.

The WEBSTER ENGINEERING COMPANY
TULSA, OKLAHOMA
Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

STILL YOUR BEST BUY...

Where pipes meet permanently...

W-S
FORGED STEEL FITTINGS
WATSON-STILLMAN
featherlite
FORGED STAINLESS STEEL
SCREWED & SOCKET WELDING
FITTINGS
STAINLESS AND ALLOY
FORGED STEEL FITTINGS

W-S FORGED FITTINGS

in CARBON, ALLOY and STAINLESS STEELS

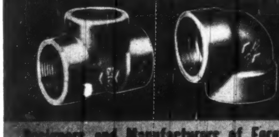
. . . Still your best buy, because W-S longer service life and increased dependability give that permanency which will lower maintenance costs . . . They are drop forged.

Basic materials are selected from a wide choice of carbon, stainless and alloy steels and then subjected to the most exacting metallurgical controls from melt to bar. Through these precautions and subsequent precision machining operations, W-S assures the utmost in accuracy of finish, perfection of threads, sockets, angles and concentricity. All W-S Fittings, — Screwed and Socket Welding Types, — are finally instrument inspected.

W-S Bulletin A3-50 details the Carbon Steel Line. Bulletin S-1 is devoted to Stainless and the Alloys. W-S will gladly furnish information on the new FEATHERLITE Fittings — a recent big step in a wide range of services. Write today for the specific bulletin you desire.

Sold Through Leading Distributors

9-L-2



DISTRIBUTOR PRODUCTS DIVISION

WATSON-STILLMAN

Established 1848

ROSELLE, NEW JERSEY

Designers and Manufacturers of Forged Steel Fittings, Valves, Wire Rope Shears, Hand Pumps, Jacks, Pipe Benders and Hydraulic Equipment

these steam traps won't freeze up!

The outdoor installation of Yarway Traps [illegible] in New Mexico and [illegible] completely eliminated [illegible]

Freeze-ups of outdoor steam traps in winter weather often cause production delays. Don't take that chance . . . especially when it's so easy to install Yarways, the steam traps that *won't freeze up.*

They won't freeze because condensate does not accumulate. The only moving part—a little valve—is continually testing for condensate, discharging it as soon as it forms. There's never anything to freeze.

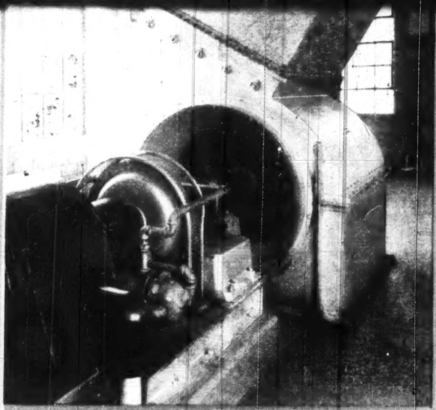
Other reasons why over 750,000 Yarway Impulse Steam Traps have been sold—they get equipment hotter, sooner; light weight; small size; easy to install and maintain; good for all pressures; made of stainless steel.

More than 200 industrial distributors sell Yarway Traps and Strainers. See your nearest one today. For name, and free 24-page Steam Trap Book, write . . .

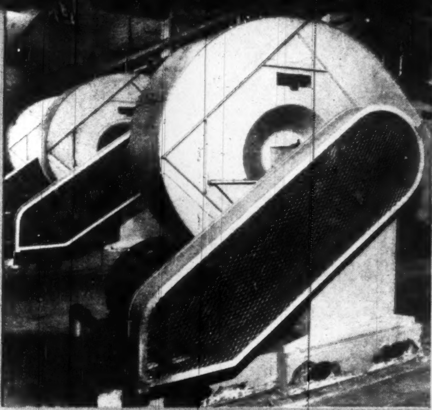
YARNALL-WARING COMPANY
107 Mermaid Ave., Philadelphia 18, Pa.

YARWAY

the steam trap designed
with more production in mind



Power Plant Mechanical Draft



Supplying Air to Industrial Coolers

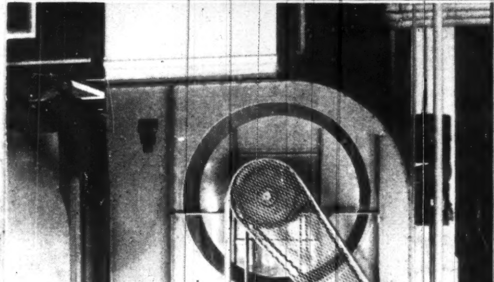
CLARAGE

HEAVY-DUTY *Air Handling and Conditioning Equipment*

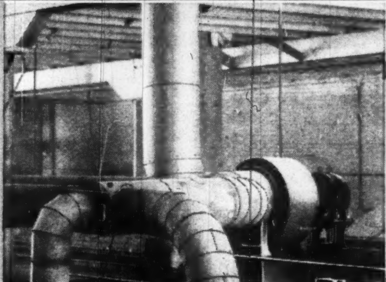
1952

CLARAGE FAN COMPANY, Kalamazoo, Michigan

APPLICATION ENGINEERING OFFICES IN ALL PRINCIPAL CITIES



Public Building Ventilation (Hospital)



Removing Waste Heat from Kilns

CONDITIONING UNITS

VORTEX CONTROL

AIR WASHERS

VENTILATING FANS

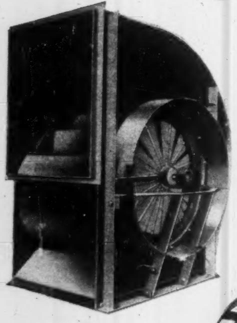
EXHAUST FANS

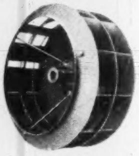
UNIT HEATERS

MECHANICAL DRAFT FANS

FANS FOR VARIOUS OTHER **PURPOSES**

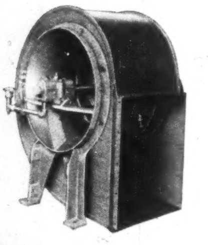
Clarage HEAVY-DUTY *Equipment*





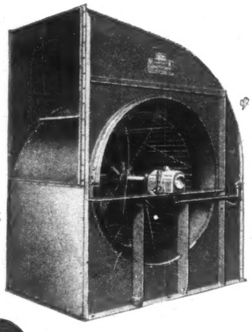
TYPE NH FAN

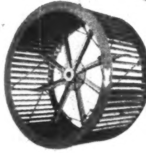
and NH fan wheel which has motor-protecting, non-overloading performance characteristics.



TYPE W FAN

and Type W fan wheel which has same performance characteristics as Type NH wheel.





TYPE HV FAN

and HV fan wheel which is designed for extreme quietness of operation.

AIR HANDLING AND CONDITIONING FANS

APPLICATIONS: These Clarage Fans are built in three types as shown. They are used for air conditioning and ventilation in all types of buildings. They are also suitable for industrial applications where clean air is to be handled at low pressures. Sizes are available with capacities from 200 to 200,000 c.f.m.

TYPE NH are moderately high speed fans designed for quiet, efficient performance when V-belt or direct driven by standard high speed motors. They are built in 11 sizes starting with **size** 80½. Type NH Fans have an all steel construction as illustrated. They can be furnished with anti-friction or sleeve type bearings.

TYPE W are also moderately high speed fans adaptable to V-belt or direct motor drive. Type W Fans are built in 9 sizes with capacities as indicated by accompanying Performance Table. Clarage side plate construction permits easy removal of wheel and rotation of fan housing for any of 8 different air discharges. Anti-friction or sleeve type bearings are standard.

TYPE HV are slow speed fans **exceedingly quiet in operation.** 28 sizes are available. Type HV Fans, up to and including size 3, are of similar construction to Type W Fans, and are adjustable as to air discharge. Larger sizes are constructed as illustrated. Dust-proof, oil-tight sleeve bearings are standard equipment.

VORTEX CONTROL as shown above can be furnished on practically all types of Clarage Fans. It is used where requirements demand that the air volume be periodically or continuously changed. Vortex Control has the low first cost of damper control, and the efficient performance of variable speed control. It saves considerably in power cost.

ABBREVIATED PERFORMANCE—TYPE HV FANS, SINGLE WIDTH, SINGLE INLET

Fan Size No.		1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	4½
Wheel Dia.		13″	16¼″	19½″	22¾″	26″	29¼″	32½″	35¾″	39″	42½″	45½″	52″	58½″
¼″ S.P. 1200 O.V.	CFM	1035	1613	2322	3156	4128	5220	6444	7782	9288	10890	12660	16524	20880
	RPM	509	407	327	281	245	217	197	178	164	146	316	120	106
	HP	.12	.18	.22	.29	.38	.48	.59	.75	.85	1.04	1.22	1.59	2.00
½″ S.P. 1300 O.V.	CFM	1122	1748	2516	3419	4472	5655	6981	8430	10062	11798	13715	17910	22620
	RPM	637	510	412	353	308	273	247	224	206	188	174	152	135
	HP	.19	.29	.36	.49	.64	.81	1.00	1.20	1.44	1.64	1.90	2.48	3.13
¾″ S.P. 1400 O.V.	CFM	1208	1882	2709	3682	4816	6090	7518	9078	10836	12705	14770	19278	24360
	RPM	748	598	490	420	367	325	294	264	245	222	206	180	160
	HP	.28	.44	.54	.73	.95	1.20	1.48	1.76	2.13	2.45	2.85	3.72	4.70
1″ S.P. 1500 O.V.	CFM	1294	2016	2903	3945	5160	6525	8055	9727	11610	13613	15825	20655	26100
	RPM	851	680	557	478	417	369	335	302	279	252	233	204	181
	HP	.39	.61	.72	.98	1.28	1.61	1.99	2.38	2.87	3.28	3.80	4.97	6.26
1¼″ S.P. 1600 O.V.	CFM	1380	2150	3096	4208	5504	6960	8592	10375	12384	14520	16880	22032	27840
	RPM	944	754	618	530	463	410	371	336	309	280	261	228	203
	HP	.52	.80	.93	1.26	1.66	2.09	2.58	3.13	3.72	4.33	5.02	6.55	8.27
1½″ S.P. 1800 O.V.	CFM	1652	2420	3482	4734	6192	7830	9666	11672	13932	16335	18990	24786	31320
	RPM	1039	830	683	585	512	453	410	369	341	308	286	250	222
	HP	.70	1.09	1.30	1.77	2.31	2.92	3.61	4.25	5.20	5.82	6.77	8.82	11.1

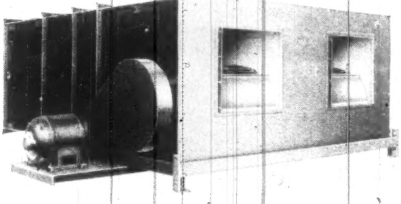
NOTE: For performance of double width, double inlet HV Fans (available in sizes No. 1½ and larger) multiply CFM x 2, RPM x 1.015, BHP x 2.1 and OV x 1.11.

ABBREVIATED PERFORMANCE—Type W and Type NH Fans, Single Width, Single Inlet

Fan Size No.		TYPE W									TYPE NH			
		1¼	1⅜	1½	1¾	2	2¼	2½	2¾	3	80½	89	98	108½
Wheel Dia.		16¼″	17⅞″	19½″	22¾″	26″	29¼″	32½″	35¾″	39″	40¼″	44½″	49″	54¼″
¼″ S.P. 1000 O.V.	CFM	1344	1627	1935	2630	3440	4350	5370	6485	7740	9330	11410	13850	16920
	RPM	809	735	620	532	464	412	372	338	310	276	250	227	205
	HP	.11	.13	.14	.19	.25	.32	.39	.48	.57	.64	.79	.96	1.17
½″ S.P. 1200 O.V.	CFM	1613	1952	2322	3156	4128	5220	6444	7782	9288	11196	13692	16620	20304
	RPM	1035	940	792	680	594	528	476	432	396	355	321	291	263
	HP	.24	.29	.29	.40	.52	.66	.81	.98	1.17	1.36	1.67	2.02	2.47
¾″ S.P. 1300 O.V.	CFM	1747	2115	2516	3419	4472	5655	6981	8430	10062	12129	14833	18005	21996
	RPM	1188	1079	908	778	680	604	544	494	454	410	371	337	305
	HP	.37	.45	.43	.59	.77	.98	1.20	1.46	1.73	2.07	2.53	3.07	3.76
1″ S.P. 1400 O.V.	CFM	1882	2278	2709	3682	4816	6090	7518	9079	10836	13062	15974	19390	23688
	RPM	1325	1203	1012	868	760	676	608	552	506	461	417	378	342
	HP	.51	.62	.60	.83	1.08	1.36	1.68	2.04	2.41	2.89	3.54	4.29	5.25
1¼″ S.P. 1500 O.V.	CFM	2016	2441	2903	3945	5160	6525	8055	9727	11610	13995	17115	20775	25380
	RPM	1449	1317	1108	948	830	736	664	604	554	507	459	417	376
	HP	.68	.82	.80	1.09	1.42	1.79	2.21	2.68	3.19	3.82	4.67	5.66	6.92
1½″ S.P. 1600 O.V.	CFM	2150	2603	3096	4208	5504	6960	8592	10376	12384	14928	18256	22160	27072
	RPM	1567	1423	1204	1032	902	800	722	656	602	551	498	453	409
	HP	.86	1.04	1.01	1.37	1.80	2.25	2.81	3.41	4.03	4.85	5.93	7.20	8.80

NOTE: For performance of double width, double inlet Type W and NH Fans (available in sizes No. 1⅜ and larger) multiply CFM x 2, RPM x 1.02, BHP x 2.08 and OV x 1.11.

Clarage HEAVY-DUTY *Equipment*

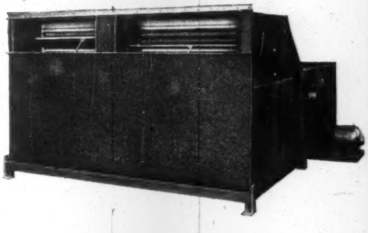


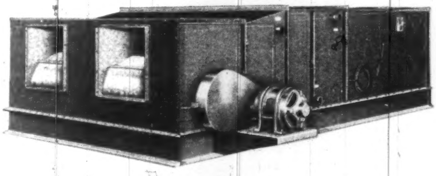
MULTITHERM CONDITIONING UNIT

Horizontal type for ceiling or platform installation — vertical floor type units also available.

BLOW-THRU MULTITHERM →

with zone control providing uniform conditioning results in various parts of building by compensating for variable heat and cooling loads.





← CAPILLARY CONDITIONING UNIT

Horizontal type for ceiling or platform installation — vertical floor type capillary units also available.

AIR CONDITIONING UNITS

APPLICATIONS: Clarage Multitherms are ideal for industrial services, both comfort and process applications. Where products are weather-sensitive, they help speed production, insure uniform quality, decrease spoilage. Multitherms are equally suitable for conditioning offices, restaurants, stores, hospitals, etc.

The equipment cost is relatively low, and units can be installed as easily and inexpensively as unit heaters — **no drastic building alterations necessary.**

Multitherms can be furnished to provide all functions of year-round air conditioning, summer cooling or winter conditioning only. Units are **extremely quiet** in operation. Aside from filter renewal and occasionally oiling the fan bearings, Multitherms require no attention summer or winter.

BLOW-THRU MULTITHERMS are conditioning units designed to maintain required temperatures and humidities in zones having different simultaneous loads.

A single unit is capable of air conditioning an **entire** medium size building providing in each zone, despite solar variations, wind velocities, etc., uniform air conditioning results; or different conditions in each zone as desired.

Zone control is accomplished by means of a separate pair of mixing dampers for each zone. One damper of each pair connects to a hot air plenum; the other to a cold air plenum. Each pair of dampers is so interconnected that one zone thermostat controls the hot and cold air mixture. Blow-Thru Multitherms are offered in 10 sizes with capacities ranging from 500 to 22,000 c.f.m.

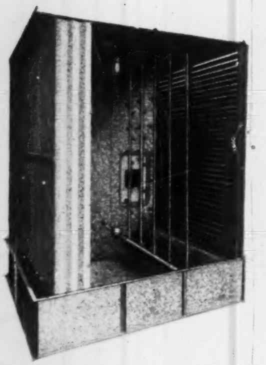
CAPILLARY AIR CONDITIONING UNITS are recommended where **exceptionally** thorough air cleaning, as well as temperature and humidity control, are required. They are used for both comfort and process applications.

The basic part of a capillary conditioning unit is the cell, each of which is a rectangular casing filled with an oriented mass of approximately 57,000 fine glass filaments. Capillary action, air flow and gravity combine to spread the spray water over each cell into a film exceeding 125 sq. ft. in area. Since minimum spray water is necessary and the sprays operate at low pressure, considerable savings in power and in initial cost of pumping equipment are effected. 7 sizes are available with basic capacities 1,800 to 20,000 c.f.m.

MULTITHERM PHYSICAL DATA

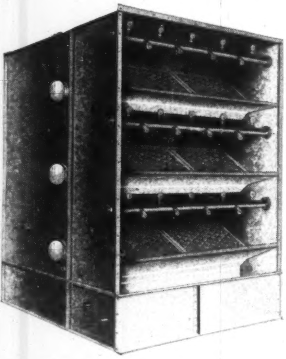
UNIT SIZE	CFM RANGE	Fan Outlet Area Sq. Ft.	FANS		Coil Face Area Sq. Ft.	Motor HP Range	FILTER SECTION DATA								
							Flat			Angle			Flat (Hi-Velocity)		
			No.	Size			No.	Size	Max. CFM	No.	Size	Max. CFM	No.	Size	Max. CFM
1205	500 1000	0.53	1	⅝	1.58	¼ ½	1	20 x 25	1000				1	20 x 25	1500
1210	700 1600	1.13	1	⅞	2.63	¼ 1	2	16 x 20	1280	2	20 x 25	2000	2	16 x 20	1920
1215	1500 2800	1.50	2	¾	4.73	¼ 1½	2	20 x 25	2000	4	20 x 25	4000	2	20 x 25	3000
1820	1900 3700	2.26	2	⅞	6.05	¼ 2	2	20 x 25	2000	4	20 x 25	4000	2	20 x 25	3000
1830	3000 5300	2.57	2	1	9.20	⅓ 3	3	20 x 25	3000	6	20 x 25	6000	3	20 x 25	4500
1840	4000 7500	4.08	2	1¼	12.38	⅓ 5	4	20 x 25	4000	8	20 x 25	8000	4	20 x 25	6000
2450	5000 9000	4.93	2	1⅜	15.10	½ 5	8	16 x 20	5120	12	20 x 25	12000	8	16 x 20	7680
3060	6000 11000	5.80	2	1½	17.90	½ 7½	6	20 x 25	6000	12	20 x 25	12000	6	20 x 25	9000
3680	8000 15000	7.87	2	1¾	24.76	¾ 10	8	20 x 25	8000	16	20 x 25	16000	8	20 x 25	12000
4120	12000 22000	10.31	2	2	36.24	1½ 15	12	20 x 25	12000	20	20 x 25	20000	12	20 x 25	18000

Clarage HEAVY-DUTY *Equipment*



SPRAY SYSTEM AIR WASHER

Offered in four different types as shown below.



CAPILLARY TYPE AIR WASHER

Designed for extremely thorough air cleaning and purification.

UNICOIL UNIT

Combining in single assembly all elements required for efficient heat transfer.

AIR WASHERS AND UNICOILS

APPLICATIONS: Clarage Spray Type Air Washers are recommended for comfort air conditioning, for dust removal and for product reclamation. They clean the air thoroughly, and provide a humidifying or dehumidifying effect as desired. As shown, 4 types are available. Capacities, based on 500-feet air velocity, range from 2,000 to 193,000 c.f.m.

FEATURES: Spray Type Washers are designed and built to give efficient, dependable service for many years. Operation and upkeep costs are extremely low, erection time is considerably below average, and all washer parts are readily accessible.

UNICOIL UNITS are a modern development for use as an integral part of a central station system for heating or cooling, or both; or for complete air conditioning in comfort applications. Unicoils are offered in a large range of sizes.

A standard unit consists of finned-copper coils, galvanized eliminator plates, galvanized settling tank and galvanized casing with inspection door.

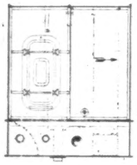
Here is ideal equipment to specify and install. It combines in one structure all elements necessary for efficient heat transfer. It eliminates assembling different parts on the job, thereby saving installation time and money.

The spray systems utilize centrifugal type, bronze alloy nozzles. Friction losses through these nozzles are low, insuring an adequate pressure head for spray effect with minimum size recirculating pump and small power requirements.

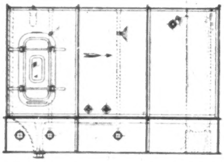
Standard equipment includes an inspection door and inlet louvre. Pump controls and other accessories can be furnished. Spray Type Washers are built of galvanized steel to provide protection against corrosive action. Special constructions can be furnished.

CAPILLARY AIR WASHERS are primarily used for industrial air conditioning services which require spray type equipment having **maximum air cleaning efficiency.** Basic parts are the capillary cells, each of which is a rectangular casing filled with approximately 57,000 fine glass filaments.

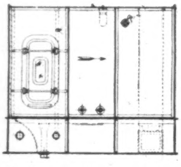
Capillary Air Washers require minimum spray water at low pressure. Savings in pump power cost and initial cost of pumping equipment are considerable. Sizes range from 4,400 to 132,000 c.f.m.



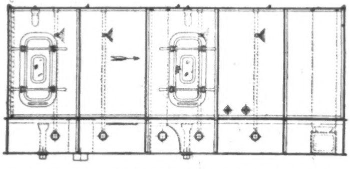
TYPE H: for air washing, purifying, and humidifying — the least expensive type. One main spray system; one set of eliminators. Length, 4 ft. 11 in.



TYPE CWW: for heavy duty humidifying, cooling and dehumidifying with cold or refrigerator water, or for condenser water cooling. Two main spray systems; one set of eliminators. Length, 8 ft. 10 in.



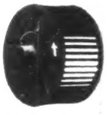
TYPE V: for washing, purifying and humidifying — a most efficient type. One main spray system; one set of eliminators with flooding spray. Length, 6 ft. 11 in.



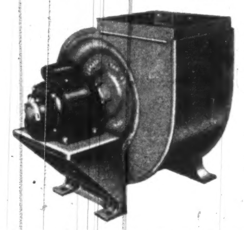
TYPE CWW — TWO STAGE: for cooling and dehumidifying with cold city or well water, industrial dust removal or material reclamation. Two main spray systems; one set of eliminators in each stage. Length, 14 ft. 0 in.

Clarage HEAVY-DUTY *Equipment*

High speed, non-overloading Ready Unit wheel.

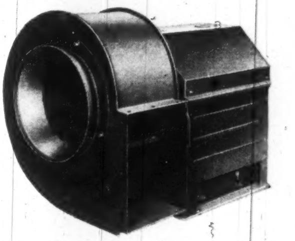


Slow speed, multiblade type Ready Unit wheel.

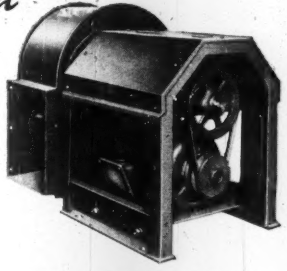


DIRECT DRIVE READY UNIT

Smaller sizes have cast iron housings — larger sizes have steel housings as shown here.



Ready Unit Ventilating Set equipped with Outdoor Covers for installation out-of-doors — front cover easily removable.



V-BELT READY UNIT

This Clarage V-belt design provides partial protection even in the standard Ready Units, as shown above, since complete drive is within framework of unit.

READY UNIT VENTILATING SETS

APPLICATIONS: Ready Units are suitable for handling small ventilating supply and exhaust jobs of many types — widely used in laboratories, factories, offices, restaurants, radio stations, TV studios, homes, etc. They are noted for **quiet, economical performance.** 13 sizes are available with capacities 200 to 7,000 c.f.m.

CONSTRUCTION: All units are furnished **complete ready to run,** either equipped with AC or DC motors as required. They are built for both direct motor and V-belt drive as shown. Direct motor driven units have cast iron housings in the two smaller sizes; steel housings in the larger sizes. All V-Belt units have steel housings. Smaller size units are equipped with multiblade type wheels; larger sizes with non-overloading, backwardly inclined blade wheels. Direct driven units have the fan wheel mounted on the motor shaft — no fan bearings necessary. V-belt units are furnished with graphite-bronze bearings that seldom require attention (oiling). Specially constructed units for handling corrosive gases and for other special conditions can be furnished.

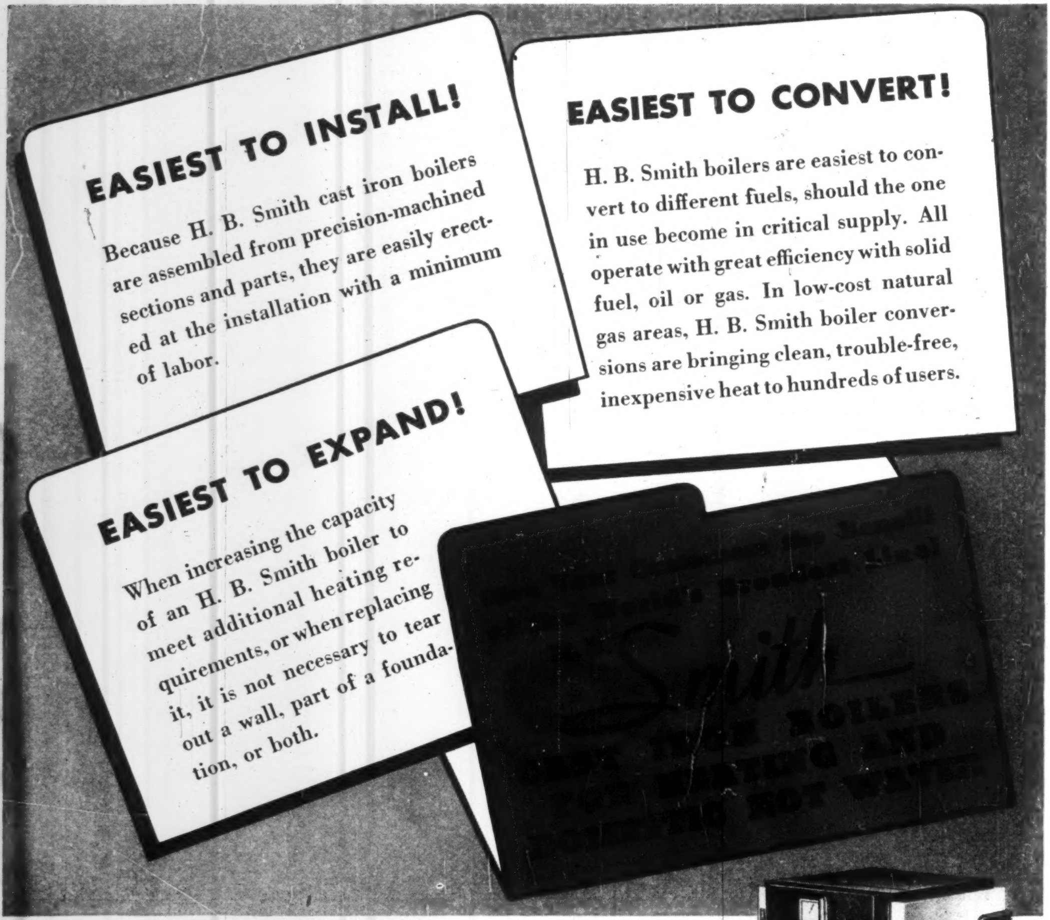
All units can be equipped with Clarage Vortex (capacity) Control which has the low first cost advantage of a damper and the power saving feature of variable speed control.

OUT-DOOR INSTALLATIONS: Where it is essential or advantageous to locate the fan equipment out-of-doors, Ready Units can be furnished in all sizes to meet such requirements by the addition of Outdoor Covers to standard assemblies. These covers are built as shown with openings at the top for bearing lubrication, and with the front cover removable for easy access to bearings, motor and drive. Ready Units on outdoor installations give long-lasting service.

ABBREVIATED PERFORMANCE — DIRECT CONNECTED UNITS

Unit No.		H.P. Motor	Speed		CAPACITY IN CU. FT. PER MINUTE					
					RESISTANCE (SP) W. G.					
					⅛"	¼"	⅜"	½"	¾"	1"
½ Half Width		1/20	850	cfm	141	20				
				ov	1620	229				
	*	1/8	1150	cfm	180	157	127			
				ov	2065	1800	1455			
	**	1/6	1725	cfm	287	275	259	245	210	
				ov	3290	3150	2970	2810	2410	
½ L.S.		1/20	850	cfm	242	41				
				ov	1200	209				
	*	1/8	1150	cfm	360	315	255			
				ov	1800	1600	1300			
	**	1/6	1725	cfm	575	550	518	490	420	
				ov	2900	2800	2630	2500	2100	
⅝ L.S.		1/20	850	cfm	515	450				
				ov	1690	1480				
	*	1/8	1150	cfm	735	680	625	560		
				ov	2400	2200	2050	1825		
	**	1/2	1740	cfm	1153	1130	1059	1040	970	885
				ov	3550	3480	3400	3380	3180	2850
¾ L.S.		1/4	860	cfm	975	875	765	640		
				ov	2000	1800	1575	1318		
	*	1/2	1150	cfm	1400	1300	1225	1135	965	785
				ov	2882	2675	2520	2337	1990	1616
	**	1 1/2	1740	cfm	2180	2100	2060	1990	1890	1780
				ov	4490	4325	4242	4100	3892	3660
⅞ H.S.		1/20	850	cfm	550	365	110			
				ov	830	552	167			
	*	1/8	1150	cfm	825	710	575	400		
				ov	1125	1072	870	605		
	**	1/3	1725	cfm	1335	1270	1190	1110	940	730
				ov	2010	1920	1800	1690	1420	1105
1 H.S.		1/8	850	cfm	875	685	455	120		
				ov	1015	793	528	139		
	*	1/6	1150	cfm	1275	1145	1000	835	435	
				ov	1475	1327	1158	967	504	
	**	3/4	1740	cfm	2010	1940	1860	1780	1600	1390
				ov	2315	2223	2153	2031	1850	1612
1⅛ H.S.		1/8	860	cfm	1310	1110	865	575		
				ov	1193	1005	788	524		
	*	1/3	1150	cfm	1860	7020	1580	1400	1000	530
				ov	1694	1570	1440	1276	912	483
	**	1	1740	cfm	2930	2850	2760	2665	2475	2245
				ov	2670	2600	2517	2430	2255	2050
1¼ M.S.		1/4	860	cfm	1595	1470	1300	1110		
				ov	1186	1095	967	825		
	*	1/3	1150	cfm	2175	2130	2050	1940	1690	1400
				ov	1615	1585	1525	1445	1255	1040
	**	1 1/2	1740	cfm	3305	3290	3280	3240	3130	2980
				ov	2460	2445	2440	2410	2330	2217
1½ M.S.	*	1/2	860	cfm	2950	2875	2760	2625	2250	
				ov	1525	1485	1425	1355	1162	
	**	1	1150	cfm	4050	3965	3900	3850	3660	3430
				ov	2095	2050	2015	1990	1890	1770
1¾ M.S.	*	1	860	cfm	4725	4625	4520	4400	4075	3590
				ov	1795	1760	1720	1670	1550	1365

Units marked * are moderately quiet. Units not starred are very quiet in operation. Units marked ** are not quiet and only should be used for industrial applications.



EASIEST TO INSTALL!

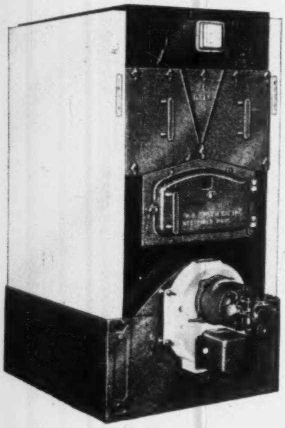
Because H. B. Smith cast iron boilers are assembled from precision-machined sections and parts, they are easily erected at the installation with a minimum of labor.

EASIEST TO CONVERT!

H. B. Smith boilers are easiest to convert to different fuels, should the one in use become in critical supply. All operate with great efficiency with solid fuel, oil or gas. In low-cost natural gas areas, H. B. Smith boiler conversions are bringing clean, trouble-free, inexpensive heat to hundreds of users.

EASIEST TO EXPAND!

When increasing the capacity of an H. B. Smith boiler to meet additional heating requirements, or when replacing it, it is not necessary to tear out a wall, part of a foundation, or both.

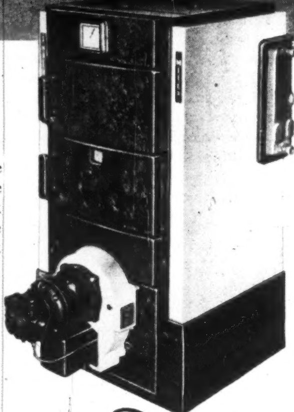


100 Boiler-Burner Unit Means More Home Sales

Compact, easy to install! Designed to give fast heat and plenty of hot water for the average home. Furnished with built-in tank type or "tankless" water heater; available with flush jacket as shown, or with jacket expanded to conceal the oil burner.

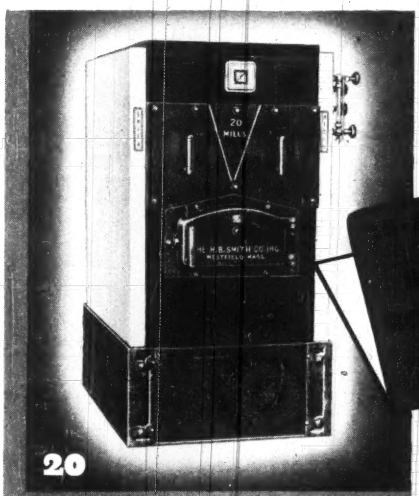
Lowest-Cost Heat and Hot Water With the 2000 Unit

Built specifically for larger homes with two or more baths and water-consuming appliances, or small commercial establishments. With over-size five-gallon-a-minute tankless water heater built in the boiler; it's the *lowest initial cost and lowest operating cost* method of supplying hot water.



H. B. Smith

THE H. B. SMITH CO., INC.
Westfield, Mass.



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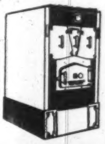
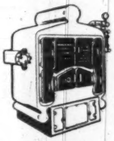


25

15

15-20-25 Smith-Mills Boilers For all Systems

Here's a complete series of modern push nipple boilers available in models for oil, gas, coal stoker or hand firing, with provision for built-in domestic water heaters and controls. Capacities of 200 sq. ft. to 2275 sq. ft. steam radiation.



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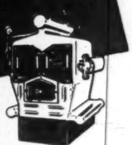
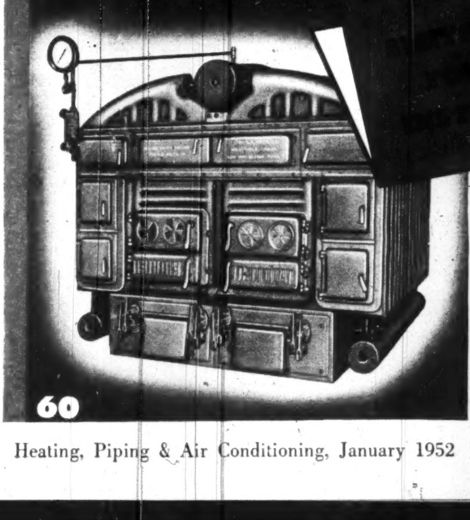


24

24-34-44 Series Mills Water Tube Boilers

Capacities of 900 sq. ft. to 13,380 sq. ft. steam radiation. Independent header type construction; there are tens of thousands of famous Mills boilers in schools, hospitals, apartment houses, stores, and other commercial and public buildings. Models for hand and all types of automatic firing.



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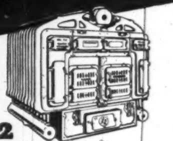


42

42 and 60 Smith Boilers For Large Installations

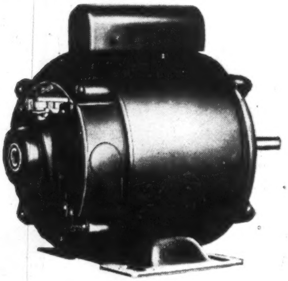
May be used singly, or in batteries for heating loads up to and over 100,000 sq. ft. steam radiation. Many of these large units installed in industrial plants furnish steam for process requirements as well as for heating and domestic hot water.

H. B. Smith CAST IRON BOILERS
THE H. B. SMITH CO., INC., WESTFIELD, MASS.
Offices and Representatives in Principal Cities

Century MOTORS

FOR HEATING, VENTILATING AND REFRIGERATION

Assure Satisfactory Performance Because:



- Correct operating characteristics provide top performance for each kind of equipment they drive.
- They start quietly and run quietly.
- Sturdy construction means long life — insulation resists dampness in basements where much of equipment is used.
- An Authorized Century Service Station is near to give fast service when it is required. Get acquainted with your Century Service Station operator.

Typical Century Motor Applications

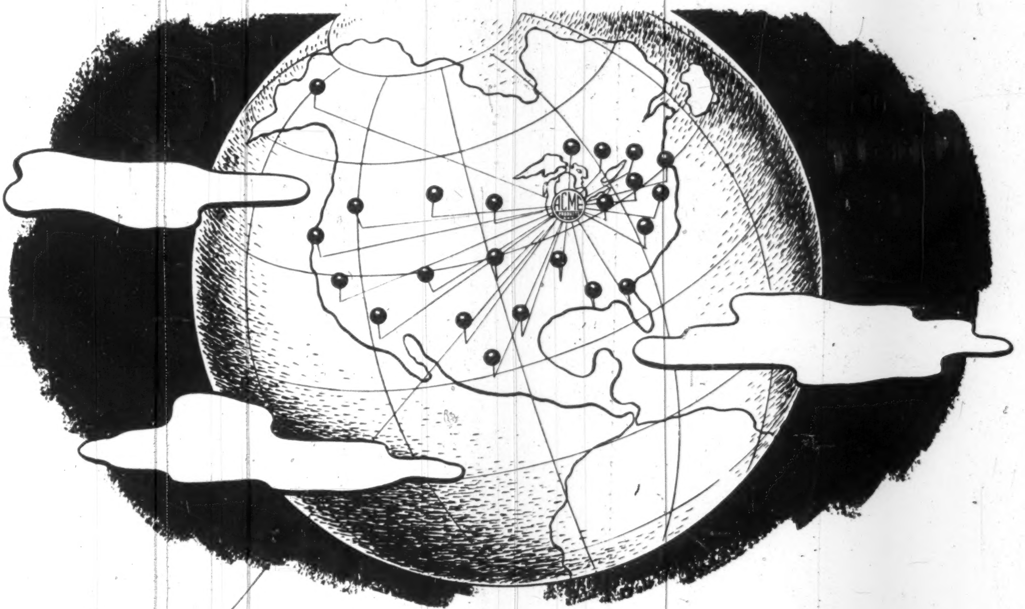
- **Oil Burner Motors** — meet requirements of underwriters — each motor is balanced — smooth, trim appearance, easy to clean — compact dimensions — all mounting dimensions industry standard.
- **Unit Heater Motors** — NEMA standard for shaft mounted Fans and Blowers. Furnished: single speed — two speed or adjustable speed. For operation on single or polyphase or direct current.
- **Fan or Blower Motors** — For attic fans — window fans — exhausters — air spreaders — furnace blowers. A. C. — D. C. Motors for all forms of air moving jobs.
- **Stoker Motors** — For home and commercial sizes.
- **Refrigeration Compressor Motors** — Up to 400 H. P. — single or multi-speeds — high starting torque for hard-to-start loads — designed for use with automatic starters for refrigeration cycling. Century motors are widely known for their unusually quiet *starting* and *running*.
- **Pump Motors** — Up to 400 H. P. — for water circulating heating systems — refrigeration systems — all form of liquid moving.

Century offers a wide range of types and sizes up to 400 H. P. — with operating characteristics to suit the wide range of driven equipment. Call a Century Branch sales office or your local distributor.

711

Century C MOTORS

CENTURY ELECTRIC COMPANY [illegible]
Offices and Stock Points in Principal Cities



Acme products are in use Everywhere

In every major industrial center, you will not have far to go—to see a successful and efficient installation of *ACME* Refrigeration or Air Conditioning equipment. In offering practical solutions to temperature control problems, *ACME* Engineers have had an opportunity to study normal and abnormal temperatures, humidity and prevailing conditions. From this long experience *ACME* Engineers have developed a line of refrigeration and air conditioning components that meet practically every requirement of the Refrigeration and Air Conditioning Industry. Whatever your immediate problem may be, the chances are that the nearest *ACME* representative can show you an actual installation of *ACME* products which is successfully meeting requirements similar to yours. *ACME* Products have been tried and are in actual use in practically every climate under practically every possible condition. You can depend on this long established and time tested line of major refrigeration components to give you efficient, low cost, long lasting service.

THE COMPLETE Acme LINE INCLUDES

- **Freon Shell and Coil, Shell and Tube and Ammonia Condensers.**
- ***Dry-Ex Water Coolers**
- ***Hi-Peak Water Coolers**
- **Heat Exchangers**
- **Unit Coolers**
- **Oil Separators**
- **Convectors**
- ***Flow Cold Liquid Chillers**
- **Evaporative Condensers**
- **Cooling Towers**
- **Liquid Receivers**
- **Air Handling Units**

* TRADE MARK

Free Consultation with ACME Engineers is yours for the asking.
Write ACME INDUSTRIES, INC., Dept. HP, Jackson, Michigan

ACME
PRODUCTS
★★★

ACME INDUSTRIES, INC., JACKSON, MICHIGAN, U.S.A.
Refrigeration and Air Conditioning Division

CONTINUOUSLY SERVING THE AIR CONDITIONING AND REFRIGERATION INDUSTRY SINCE 1919

Century MOTORS

FOR HEATING, VENTILATING AND REFRIGERATION

Assure Satisfactory Performance Because:

- Correct operating characteristics provide top performance for each kind of equipment they drive.
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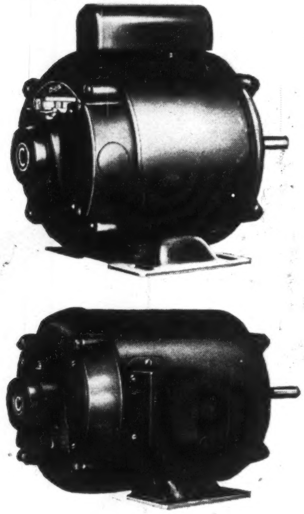

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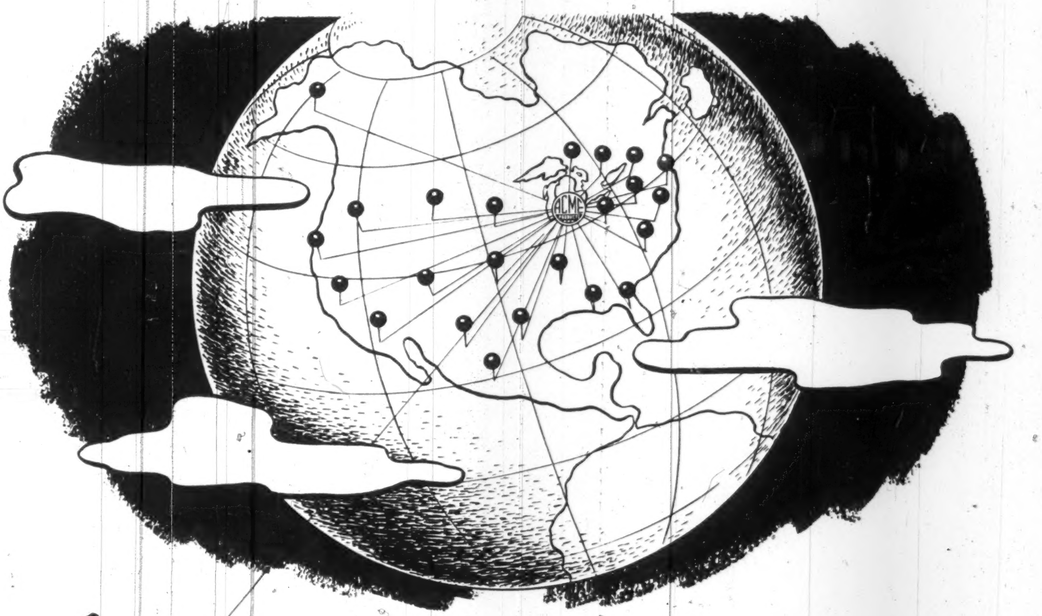
711

Century C MOTORS

CENTURY ELECTRIC COMPANY • [illegible]

Offices and Stock Points in Principal Cities



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- **Unit Coolers**
- **Oil Separators**
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- **Evaporative Condensers**
- **Cooling Towers**
- **Liquid Receivers**
- **Air Handling Units**

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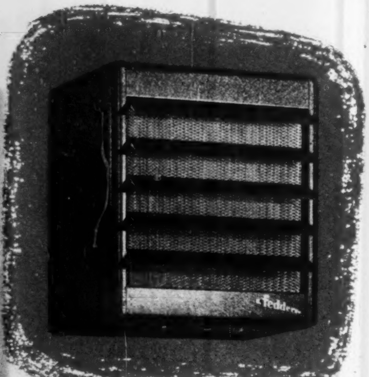
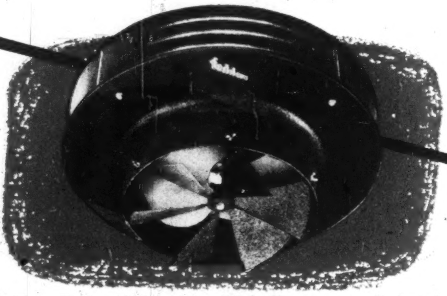
Write ACME INDUSTRIES, INC., Dept. HP, Jackson, Michigan

ACME INDUSTRIES, INC., JACKSON, MICHIGAN, U.S.A.
Refrigeration and Air Conditioning Division
CONTINUOUSLY SERVING THE AIR CONDITIONING AND REFRIGERATION INDUSTRY SINCE 1919

fedders

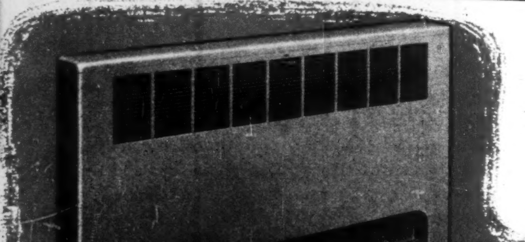
A GREAT NAME IN COMFORT



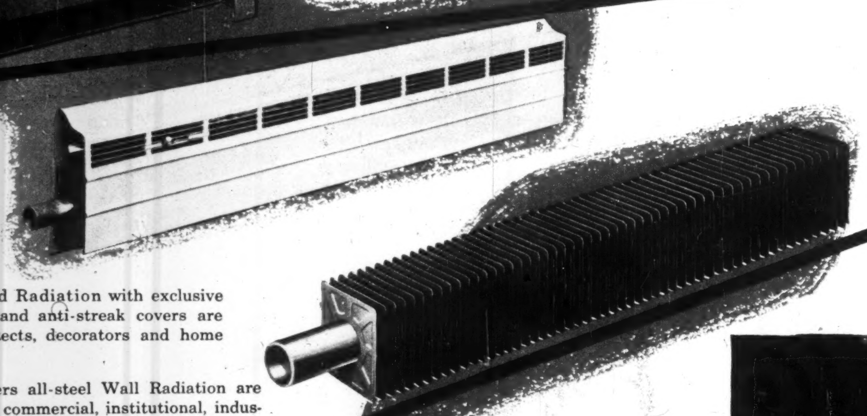


Fedders Series 16 Downblow Unit Heaters are designed for installations involving high ceilings, craneways, frequently opened factory and garage doors.

Fedders Series 15 Horizontal Unit Heaters are widely used in factories, stores, service stations.



Fedders code rated Convector-Radiators with compact, high efficiency heating elements are made in a wide range of free standing and semi-recessed models. Ideal for new and replacement work.



Fedders Baseboard Radiation with exclusive directional louvers and anti-streak covers are welcomed by architects, decorators and home owners.

Miles of Fedders all-steel Wall Radiation are being used for commercial, institutional, industrial and residential heating. Available with or without covers.

THE QUALITY LINE *for* 1952

• Architects, interior decorators, contractors and home owners approve the Fedders line of modern quality radiation and unit heaters.

Making Warm Friends for every Man who Designs, Specifies, Sells, Installs and Uses Heating Equipment

They combine every advantage and economy of handsome appearance, cleanliness, uniform heating, easy stocking and installation.

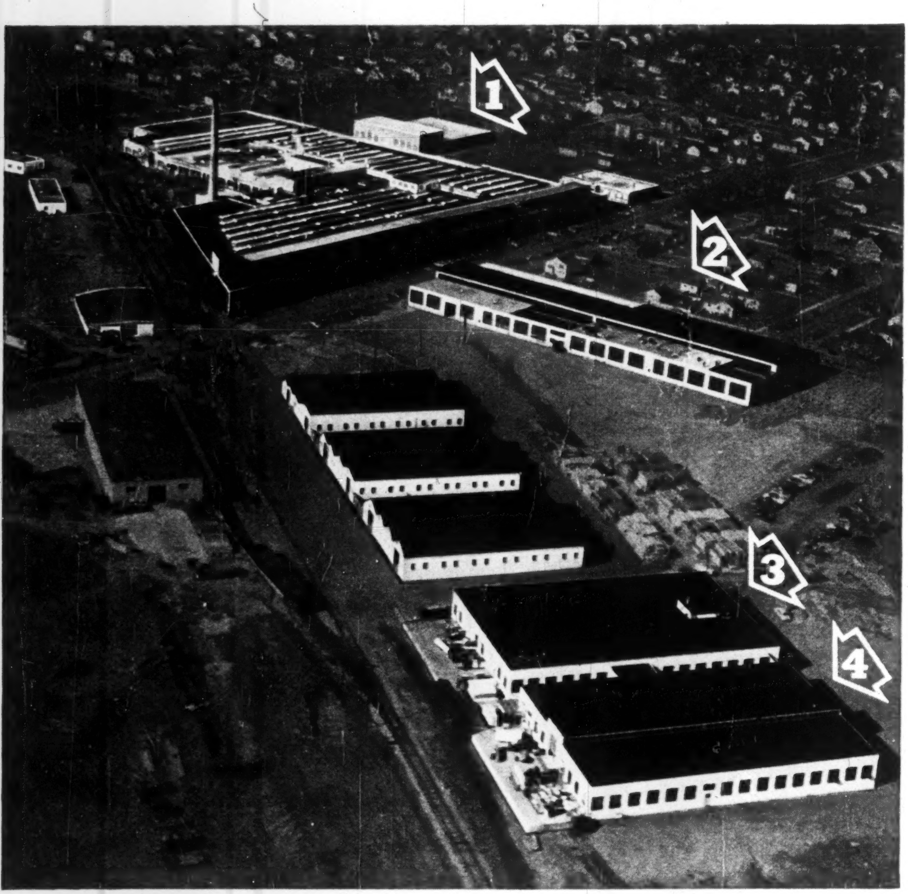
Fedders complete line of Convector-Radiators, Baseboard Radiation, Wall Radiation and Unit Heaters offer well-graduated, standardized sizes and capacities. They meet a wide range of requirements for residential, institutional, industrial and commercial installations.

Complete design and specification data are yours for the asking. Write:

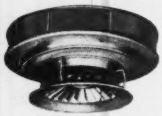
FEDDERS-QUIGAN CORPORATION

57 TONAWANDA STREET • BUFFALO 7, N. Y.

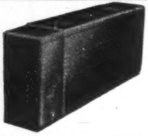
TRANE ADDS 4 NEW PLANTS...



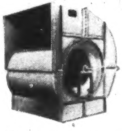
New buildings completed in recent Trane construction program. Arrows indicate: **1**) Tool Building, a separate unit immediately north of the Main Plant, **2**) a complete plant for assembly of standard heat transfer surface, **3**) Brazed Aluminum Plant, **4**) Special Heat Transfer Products Assembly Building.



More Unit Heaters—Plant additions permit expansion of unit heater assembly lines—more heat for army camps and defense plants.



More Unit Ventilators—With more schools being built, demands are high for the warm, fresh air produced by Trane Unit Ventilators.



More Fans—Trane introduced a new line of centrifugal fans recently. Popular acceptance and increased sales make more manufacturing space necessary.

TO INCREASE PRODUCTION SPACE

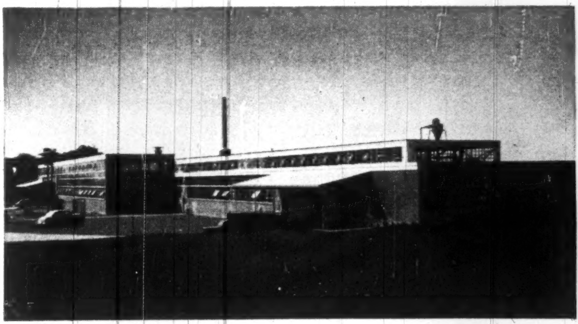
More Room to Manufacture a Complete Line of Heating, Ventilating and Air Conditioning Products

Trane builds again. To manufacture more and better heating, ventilating and air conditioning equipment, Trane is completing a major expansion program. Four new buildings have been added at La Crosse. Total factory space has been increased substantially. Many workmen have been added to Trane payrolls.

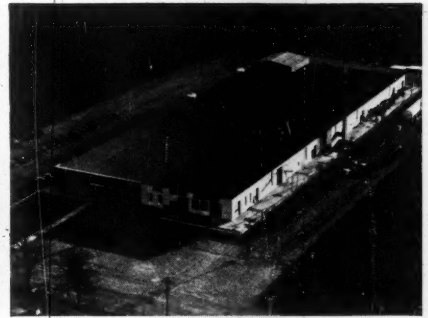
Much of the new space will be used to turn out more Trane products faster. With defense construction increasing sharply, the demand for standard Trane heating equipment is at an unprecedented high level. At the same time, the popularity of recently announced products has required additional capacity to produce them. More room will, therefore, be devoted to the manufacture of fans, refrigeration products and special heat transfer equipment.

All the space in one of the new buildings will be used to produce the dies and jigs used in the manufacture of Trane products. This ultra-modern tool shop will have twice as much machinery and will, thanks to newest tool making methods, produce three times as many tools. The new tool building will help increase production two ways. It will make more tools available quickly and on schedule. And, by pre-testing each item, it will save hundreds of hours of production time.

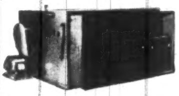
With these new buildings to expand and improve production, Trane is better able to serve the architect, engineer, contractor and the armed forces with a complete line of heating, ventilating and air conditioning equipment.



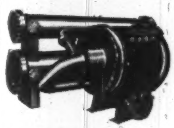
In Canada, too! Expansion has not been limited to the La Crosse plant. At Toronto, Trane Company of Canada, Ltd., has completed a new suburban factory, the first step in enlarging and consolidating its manufacturing facilities.



At Scranton, Pennsylvania, the Eastern Manufacturing Division, The Trane Company has not only added more manufacturing space, but also more production equipment.



More Climate Changers—As industry finds new ways to use air in speeding manufacturing processes, the need for Trane air conditioning units increases.



More Refrigeration Units — More centrifugal and reciprocating compressors will be made in space furnished by the Trane expansion program.

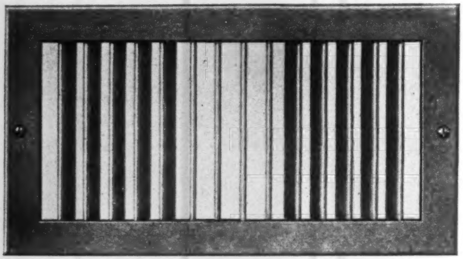
TRANE

MANUFACTURING ENGINEERS
OF HEATING, VENTILATING AND
AIR CONDITIONING EQUIPMENT
THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division . . . Scranton, Pa.
Trane Company of Canada, Ltd. . . . Toronto
OFFICES IN 80 U.S. AND
14 CANADIAN CITIES

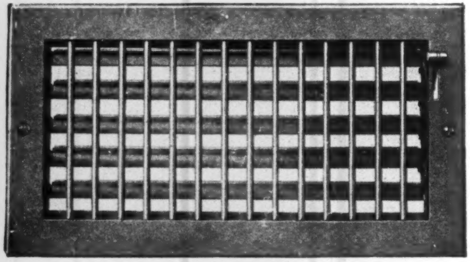
Your Best Buy in Top Quality Multiple Diffusion

Registers and Grilles for HIGH VELOCITY OUTLETS

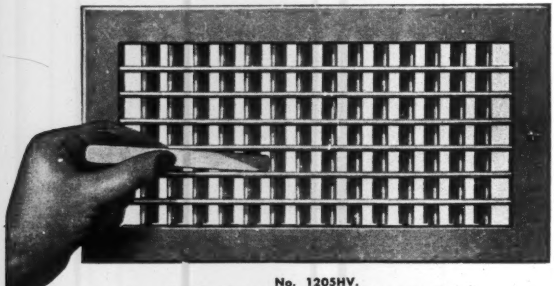
The AUER "*Streamliners*"



No. 1005V.
Single bank of adjustable bars, no valve.



No. 1005V-HML.
Single bank of adjustable bars, with multi-louvre valve.



No. 1205HV.
Double bank of adjustable bars, no valve.

In these registers and grilles, the bars are carefully formed, smooth in contour. Bars are pivoted in frame on special split sleeves, or "expansion" inserts, furnishing proper tension to hold bar firmly in position (and maintain silence when register is in operation at high velocity) yet adjustable to any desired angle. Bars have "tear-drop" shape in cross-section, somewhat like an airplane wing, and being pivoted at the exact center, may be completely reversed. This permits you to turn the *thin* edge outward, if you wish (and the *broader* edge toward airflow) cutting resistance and turbulence to the minimum. Bars may be set in any grouping, and repeated adjustments will not affect their rigidity when set. Shutters of multi-louvre control valves are pivoted on rivets to prevent vibration. All Streamliner registers equipped with gaskets.

8 MODELS. The Series includes models with single bank of adjustable bars (vertical or horizontal), also with double bank of adjustable bars (vertical in front and horizontal in back, or the reverse), also all above four types with the addition of horizontal multi-louvre valves in the rear, controlled by lever on face of register.

Ask for Bulletin S-50. For forced air or gravity registers, we will send you Auer Register Book—for perforated grilles, Catalog "G".

THE AUER REGISTER CO., 6600 CLEMENT AVENUE, CLEVELAND 5, OHIO
Canadian Distributor, Marchand Furnace, Ltd., Tilbury, Ont.

Auer REGISTERS
& GRILLES *for* AIR CONDITIONING & GRAVITY

Webster
HEATING

A CONDENSED DESCRIPTION OF STEAM AND HOT WATER HEATING EQUIPMENT

PRODUCTS DESCRIBED

Webster Baseboard Heating
Webster Walvector® Radiation
Webster System Convector Radiation
Webster Radiator Valves
Webster Thermostatic Traps
Webster Float-and-Thermostatic Traps
Webster Process Steam Traps
Webster Dirt Strainers
Webster-Nesbitt Unit Heaters
Webster Moderator Systems of Steam Heating
Webster Continuous Flow Hot Water Heating Control
Webster Control Valves

PRODUCTS MANUFACTURED BUT NOT DESCRIBED IN THE FOLLOWING PAGES DESCRIPTIVE BULLETINS AVAILABLE

Webster Double Service Valves, Radiator Trap Attachments, Boiler Return Traps and Vent Traps used in Type R and Type V Systems, Lift Fittings, Strainers, Expansion Joints, Vacuum Breakers, Boiler Protectors, Metering Orifices.

OTHER PRODUCTS: Chain wheel, extended stem and lockshield key special handles for radiator valves, Check Valves, Gauges, Grease Traps, Sight Glasses, Hylo Vacuum Controllers, Pressure Difference Controllers, Time Switches, One-pipe System Controls, Steam and Oil Separators.

For additional information, consult Webster Representatives

NOTICE—*In the following pages, we describe Webster Equipment currently in production. Availability is subject to government regulations. We reserve the right to change materials and designs without notice.*

WARREN WEBSTER & COMPANY

Factory and Home Office: CAMDEN 5, NEW JERSEY

Est. 1888 : Representatives in Principal U. S. Cities

Webster TRU-PERIMETER

Webster Baseboard Heating with Forced Hot Water

Webster Baseboard Heating is a patented forced hot water system in which a convector heating element fits behind a specially built metal baseboard. It is run in a continuous loop around the exposed walls of the house with a separate loop for each floor (see Fig. 4). Air enters through a space at the floor line, passes over the heating element, is warmed and comes out at the top of the baseboard enclosure (see Figs. 3 and 5). Baseboard extends $2\frac{1}{8}$ inches beyond plaster line.

Advantages

- Simplicity of piping saves installation cost
- Room temperatures vary less than 2° between floor and ceiling
- Baseboard is inconspicuous—more room in every room
- Complete freedom in decorating

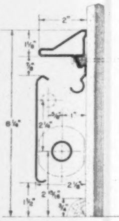


Fig. 1. Section through Webster Baseboard Heating (HNS or HNL) and typical wall.

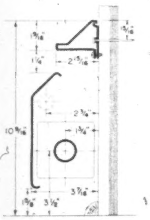


Fig. 2. Section through High Capacity Webster Baseboard Heating and typical wall.

Equipment

Heating elements: Furnished with plain ends for sweat connections. Type HNL and HNS—$\frac{3}{4}$ inch copper tubing with copper fins. Type HNL has 3 fins per inch, Type HNS has 5 fins per inch. HI-CAP—1 inch copper tubing with 3 inch square aluminum fins. Lengths—HNL and HNS 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, 5 and 6 ft.; HI-CAP 2 to 6 feet inclusive.

Brackets: One standard bracket serves all purposes for both HNL and HNS Webster Baseboard—as support for heating element; for mounting enclosure front and for positioning metal moulding with integral damper mounting socket. A separate one-piece bracket is also provided for HI-CAP, serving both as hanger for heating element and support for enclosure front.

Enclosure: 18 gauge steel, painted prime coat. Supplied in 6 ft. and 8 ft. lengths, cut on job to fit room dimensions when necessary. Trim pieces provided to cover joints. Wood enclosure will be furnished if metals are not available.

Moulding: Specially designed metal moulding is included. Furnished in 8 ft. lengths and may be cut to fit. This metal moulding is positioned by the bracket described above and incorporates a sponge rubber sealing gasket as shown in Fig. 1. Wood moulding will be furnished if metals are not available.

Damper: Optional for HNL and HNS. Furnished in 8-foot lengths and may be cut to fit. Manual damper operator fits in face of enclosure. Provides reduced heat delivery for bedrooms and elsewhere.

3-Way Valve: Optional. For reduced heat delivery, as in bedrooms for manual shut-off at night.

Controls: Optional. Webster Continuous Flow Hot Water Heating Control is recommended—see page 8. Other conventional control may be used.

Installation

Made in accordance with approved Webster Service Details furnished with each job. Related equipment such as boiler or heat exchanger, circulators, flow valves, etc., are installed in conventional manner.

Complete technical information furnished on request.

Table I. Webster Baseboard Heating: Capacity of Heating Elements in B.T.U. per Foot of Length

Heating Element	Water Temperatures (B.T.U. per foot of length)				
	160° F.	170° F.	180° F.	190° F.	200° F.
HNL-C	252	279	315	360	405
HNS-C	306	342	387	441	495
HI-CAP	480	560	640	720	800

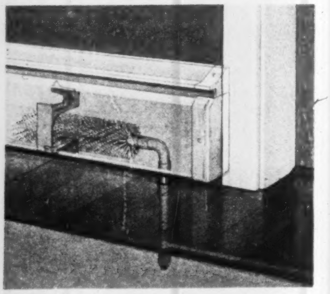


Fig. 3. Phantom view of Webster Baseboard Heating (HNS or HNL).

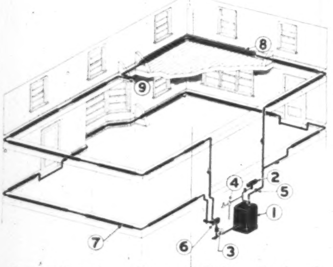


Fig. 4. Typical installation of Webster Baseboard Heating in 2-story residence. Drawing shows: ① Boiler; ② Expansion Tank; ③ Circulator; ④ Pressure Reducing and Relief Valve; ⑤ Flo-Control Valve (If Required); ⑥ Webster Return Header Assembly Including Purge and Balance Valves and Air Vent; ⑦ Webster Heating Element; ⑧ Reduced Heat Damper, or By-Pass (Optional); ⑨ Expansion Loop.

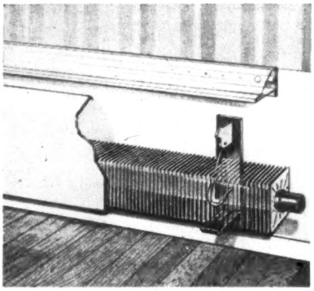


Fig. 5. Phantom view of High Capacity Webster Baseboard Heating with metal molding. Also available with wood molding.

HEATING

WEBSTER BASEBOARD HEATING
WEBSTER WALVECTOR® RADIATION

Webster Walvector® for Steam and Hot Water Heating

(Ratings on page 4)

Webster Walvector® is an elongated convector designed for mounting along the wall, close to the floor line or under windows. It combines an attractive steel enclosure and a highly efficient non-ferrous heating surface, together with appropriate mounting angles, braces, end plates, connecting trim and heating element hangers. Used together these components provide an effective means for wall to wall application, spreading the heat along the outside walls of the room or for installation in separate units similar to conventional convectors. For sizes and enclosure arrangements see Table II on page 4.

Applications

Webster Walvector® is finding widespread application in industrial, educational, commercial and institutional buildings, both in new construction and in modernization. When used with ste[illegible]ting systems Walvectors® are equipped with Webster Radiator Valves and Traps, the entire assembly being concealed within the enclosure. When used with forced circulation hot water heating Webster Walvector® is frequently connected in series, permitting operation under the perimeter heating principles developed in connection with Webster Baseboard Heating.

Advantages

Webster Walvector® assures clean heating. A rubber gasket held in place by the mounting angle thoroughly seals the space between enclosure and walls even if there are wall irregularities. This feature, together with a flat 2″ horizontal surface at the top and specially designed directional louvres, causes air flow well away from the wall.

Heating elements are of specially annealed copper tubing with rib reinforced square pressed aluminum fins, regularly furnished with plain ends for sweat fittings and on special order with threaded brass adapters. For installation in skylights and elsewhere, heating element is supplied without the Walvector® enclosure. A pressed steel cover with solid front and perforated top may be supplied where further protection is not required.

Dimensions

Walvector® enclosures are furnished in nominal lengths of 2 to 7 feet inclusive, in 1 ft. increments. Type WI heating elements are supplied in 2 to 6 feet lengths inclusive.

Completely detailed technical literature on request.

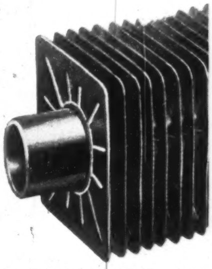


Fig. 6. End view of Webster Type WI heating element.

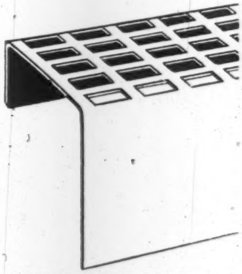


Fig. 7. Standard cover for Type WI Radiation.

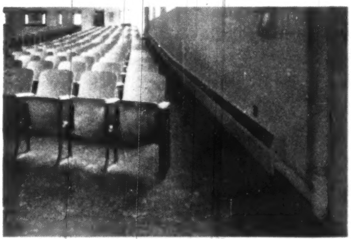


Fig. 8. Webster Walvector* in school auditorium.

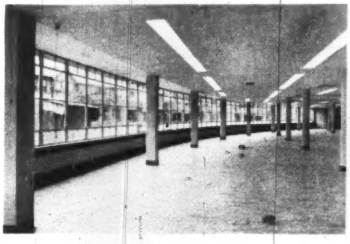


Fig. 9. Webster Walvector* heating element behind special enclosure.

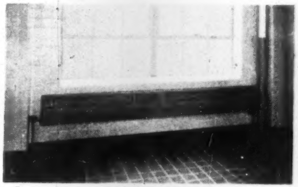


Fig. 10. Webster Walvector* in industrial plant washroom.

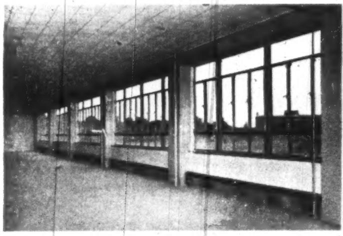


Fig. 11. Webster Walvector* in new office building.

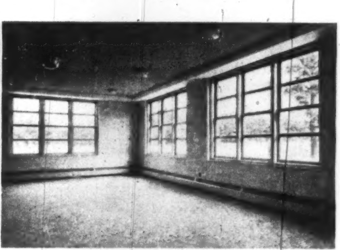


Fig. 12. Webster Walvector* in high school lunchroom.

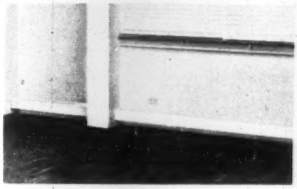


Fig. 13. Application of Webster Walvector* with standard cover.

*Reg. U. S. Pat. Off.

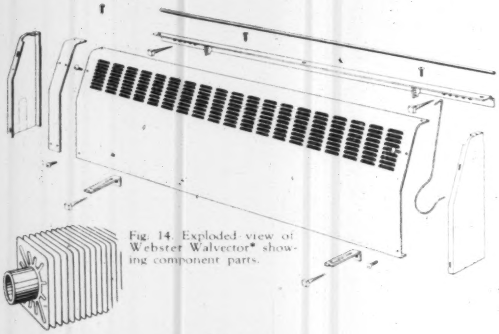


Fig. 14. Exploded view of Webster Walvector* showing component parts.

Webster Type SF Radiation

Webster Type SF Radiation has been made available to supplement Webster Walvector®. It is made entirely of steel and available in two sizes: (1) with 1¼" IPS tubing and 3¼" square fins; (2) with 2" IPS tubing and 4¼" square fins. Ratings and complete details available on request. Ask for Bulletin B-1552.

Table II. Basic Ratings of Webster Walvector* and "WI" Radiation†

Fin Size	Enclosure Arrangement	Steam Based on 1 lb. Steam, 65° Entering Air		Hot Water Based on 200° Water Temp., 65° Entering Air, 20 ft./sec. Velocity
		Sq. Ft. E.D.R. per Lineal Foot	B.t.u. per Lineal Foot	B.t.u. per Lineal Foot
3"	Single Row No Cover	5.0	1200	1085
	Single Row 11" Walvector* Enclosure	5.9	1415	1290
4"	Single Row No Cover	7.25	1740	1630
	Single Row 12½" Walvector* Enclosure	8.25	1980	1850
	Single Row 20" Walvector* Enclosure	9.7	2330	2180
	Double Row 20" Walvector* Enclosure	11.35	2725	2550

†NOTES 1. Basic Ratings for "WI" Radiation without Cover include 10% Heating Effect Factor and are based on Single Row without Cover and mounted on Wall 23" or less from Floor. When used in Skylights or Elevations higher than 23" from Floor, deduct 10% from basic Rating. Deduct 5% when standard Cover is used.

2. Ratings for Walvector* include 15% Heating Effect Factor on 11" and 12½" Enclosures, and 10% Heating Effect on 20" Enclosures.

3. Ratings were obtained from Tests conforming with Methods prescribed by Convector Commercial Standards.

*Reg. U. S. Pat. Off.

Webster CONVECTOR RADIATORS

Webster System Radiators for Steam Heating

Prefabricated convectors in which the supply valve, heating element, return trap and union connections are combined in a single compact unit, simplifying architectural and engineering design and reducing installation work. Ideal for use with Webster "Moderator" Systems of Steam Heating—see page 8. Cannot be used for hot water heating or one-pipe steam systems.

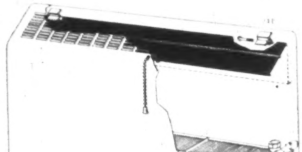
The Webster Supply Valve Handle enables the room occupant to turn on or completely shut off heat as desired. The Webster Return Trap holds steam in the heating element until condensed, thus preventing the waste of heat.

Room air enters through the lower opening and passes upward over the heating element. The warmed air ascends and re-enters the room through the upper grille. As the warm air cools in the room it falls to floor level where it again enters through the lower grille. This natural circulation of air—convection—is almost imperceptible, yet positive, tending to distribute heat uniformly throughout the room.

Currently available in two types:

1. Type MA—enclosed within wall, with complete metal front panel; arched inlet opening, see Fig. 16.
2. Type FA—free-standing exposed metal cabinet with arched inlet opening.

Fig. 15. Webster Type E Convector. Heating element is ½ inch copper tube with aluminum fins, cast brass headers. Offset connections. For ratings and dimensions, write for Bulletin B-1503.



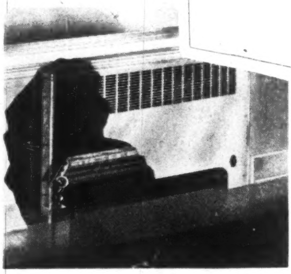


Fig. 16. Webster System Radiator. Heating element is ½ inch copper tube with aluminum fins, machine brass headers. Brass union connections included. For complete ratings and dimensions, write for Bulletin B-1500.

Webster Type E Convectors for Steam and Hot Water

Webster Type E Convectors are for hot water or steam heating service. Complete range of sizes.

Currently available in two types:

1. Type FE—free-standing floor cabinet.
2. Type SE—wall hung slope top.

Webster STEAM HEATING EQUIPMENT

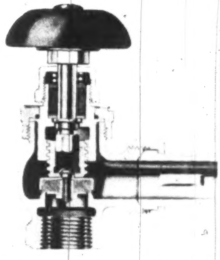


Fig. 17. Webster Series 600P Valve

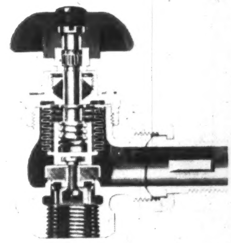


Fig. 18. Webster Series 600S Sylphon Bellows Packless Valve

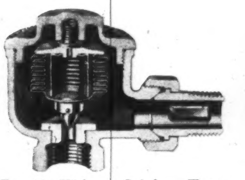


Fig. 19. Webster Sylphon Trap, 502H Model with ½" Inlet and Outlet

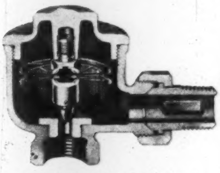


Fig. 20. Webster 702H Thermostatic Trap

Webster Radiator Valves

For low pressure vapor and vacuum steam heating. In angle, right-hand, left-hand and straightway body models. Wheel handles are standard, but lockshields, chain wheels or extended stem are obtainable.

Quick opening; modified and wide Acme form threads in stem nut provide strength and ease in opening. Non-rising stem. Modulation sleeve furnished for ½, ¾ and 1-inch sizes, at extra cost. For dimensions see Table III.

Parts inspected after each manufacturing operation. Each valve tested with steam after complete assembly.

Series 600P for pressures up to 60 lb. psi for steam and hot water heating

Made of brass. Meets specifications for "spring packless" valve. Heavy spring *automatically* exerts pressure on die-molded composition spring packing; spring housing adjustable *manually* to increase tension.

Packing seldom requires renewing, but may be installed while pressure is on.

Series 600S Sylphon bellows packless valve for pressures up to 20 lb. psi for steam heating

Genuine seamless Sylphon bellows encloses stem throughout length. True packless. Absolutely tight.

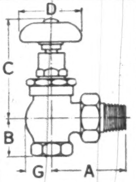


Fig. 21. Dimensions of Webster radiator valves, Angle Model.

Table III. Dimensions of Webster Radiator Valves, Angle Model

Size	All Types			Wheel* Handle		
	A	B	G	C-1	C-2	D
½	2¾	1¼	15/16	3 7/16	3 1/16	2¼
¾	2¾	1¼	15/16	3 7/16	3 1/16	2¼
1	3⅛	1⅜	1 1/16	3⅝	3¼	2¼
1¼	3⅝	1⅞	1 7/16	4 5/16	4⅝	3
1½	4	2	1⅝	5	4 9/16	3

Dimensions in Inches and Subject to Slight Variations
*C-1 is dimension of Series 600-P; C-2 is dimension of Series 600-S.

Webster Thermostatic Traps for low-pressure application

Series 7 diaphragm-type for low pressure vapor and vacuum steam heating up to 15 lb. per sq. in. Series 7M for 25 lb. per sq. in. maximum working pressure.

Series 5 has bellows type thermostatic element. Both 7 and 5 in three standard sizes and five body models.

(*continued on page 6*)

Fig. 22. Dimensions of Single Union Vertical Model 702V-1 or 502V-1 Trap. ½ in. or ¾ in. Inlet, ½ in. Outlet. For Convector Radiators and Other Applications. Dimensions:

A—4½"
B—2 5/16"
C—2 5/16"
D—⅞"

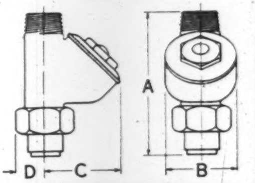


Table IV. Recommended Ratings in Sq. Ft. E.D.R.*

Symbol	Size	Pressure Difference Across Trap in Lbs. per Sq. In.							
		¼	½	1	1½	2	5	10	15
702, 502	½	85	120	165	200	235	370	530	640
713, 513	¾	165	230	330	400	465	730	1050	1300
724, 524	1	290	410	580	700	810	1280	1840	2300

*Based on 240 B.t.u. per sq. ft. per hour. Ratings are in accordance with the recommended standards adopted by the Steam Heating Equipment Manufacturers Association. Select trap directly from the above table for the lowest differential that may exist in the system.

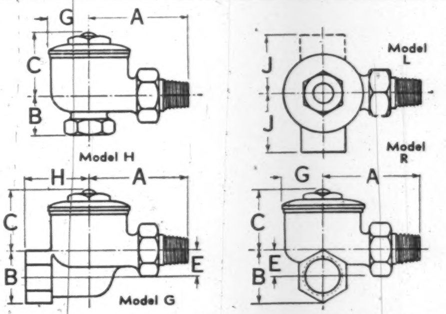


Fig. 23. Series 7 and 5 Trap Dimensions, Angle (H), Straightway (G), Right (R) and Left (L) Models.

Table V. Series 7 and 5 Trap Dimensions, Models H, G, R and L

Size	Symbol	Model	A	B	C	E	G	H	J
½	702, 502	H	2¾	1⅛	2		1 5/16		
½	702, 502	G	2¾	1½	2	¾		1 13/16	
½	702, 502	R & L	2¾	1½	2	¾	1 5/16		1⅝
¾	713	H	3 9/16	1 7/16	1 11/16		1⅝		
¾	513	H	3 1/16	1¾	2⅜		1⅛		
¾	713	G	3 9/16	1 11/16	1 11/16	¾		2¼	
¾	513	G	3 1/16	1⅞	2⅜	1		1¾	
1	724	H	4¼	1 13/16	2 5/16		1⅞		
1	524	H	3½	1⅞	3 9/16		1⅜		

All dimensions in inches subject to slight variation.

Webster STEAM HEATING EQUIPMENT

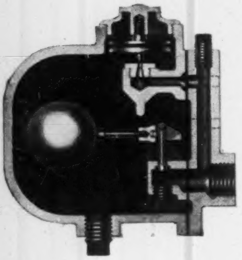


Fig. 24. Webster Heavy Duty Drip Trap, Size 00026-T

Webster Thermostatic Traps *(Continued)*

Hold steam in radiator until it has given up useful heat. Water, air and other gases completely and continuously discharged whether pressure in radiator is 15 lbs. or at any intermediate point. This is accomplished by compensating for pressure variation, a feature of all Webster Thermostatic Traps.

Thermostatic element is double diaphragm of phosphor-bronze (Series 7) and bellows of brass (Series 5) that retain "spring" characteristics. Pointed valve piece permanently adjusted. Cone shape assures positive, tight closing. Working parts interchangeable. Seats replaced quickly and easily. Thermostatic assembly replaceable as a unit. After assembly, trap is tested with both hot water and steam.

Webster Float and Thermostatic Drip Traps for working pressures up to 15 lbs. per sq. in.

Series 26-T heavy duty trap for large volumes of condensation and air. Compact and light in weight. For drips of mains, air conditioning coils, blast radiation, unit heaters, hot water generators, fan heater coils, etc. Side outlet opening. Most used sizes (00026, 0026, 026) incorporate *outward opening* discharge valve which permits valve to open when excessive pressures prevail.

Brass valve pieces and seats on water discharge end. Phosphor-bronze thermostatic air vent diaphragms with stainless steel valve pieces and seats. Other interior parts are copper, brass or iron. Cast iron bodies and covers.

Choice of two inlet and two outlet openings with Sizes 0026 and 026. Pipe plugs included for one inlet and outlet. 00026 has one inlet opening and one outlet on cover plate. Can be mounted in pipe line without other support. Sizes 126 and 226 have single end inlets and outlets. Require supporting bracket when installed.

Series 26-O is similar to 26-T Drip Trap but without thermostatic element. Used where concentration of air does not occur, as on ends of mains and risers, flash tanks and dripping gravity heating systems into vacuum return lines.

Webster Process Steam Traps and Strainers for Working Pressures up to 150 lbs. per sq. in.

Series "78" Thermostatic Trap used to discharge air and water from heating coils and apparatus using steam at process pressures. Built in 3/8, 1/2, 3/4 and 1 in. sizes.

Series "79" Float-and-Thermostatic traps for large volumes of hot condensate. Condensate passes through float controlled opening valve while air is discharged into return piping through thermostatic vent and integral by-pass. Available with 1 in. inlet and outlet which can be bushed for smaller size. Model 794-0 without thermostatic vent.

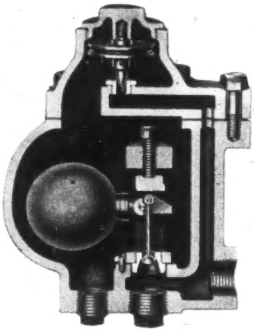


Fig. 25. Webster Size 0026-T Heavy Duty Drip Trap

"78" Dirt Strainers are placed in return lines of steam using equipment and steam heating systems to catch dirt and other particles to prevent impairment of tightness of traps. Easily cleaned. Maximum working pressure 150 lb. psi for sizes up to 2", 125 lb. for 2½" and up.

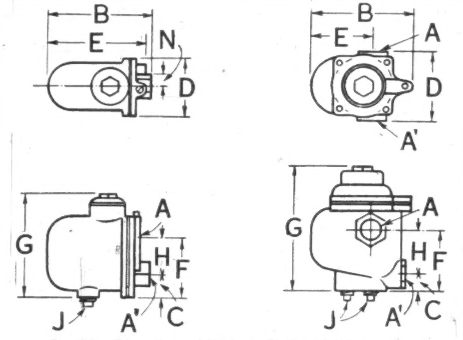


Fig. 26. Dimensions of Webster Series 26 Drip Traps

Table VI. Dimensions of Webster Series 26 Drip Traps

Symbol	A	B	C	D	F	G	H	J	Net Wt.
00026-T	3/4	6 5/8	1 1/2	3 3/4	3 7/8	6 5/8	2 3/8	1/2	10
00026-O	3/4	6 5/8	1 1/2	3 3/4	3 7/8	6 5/8	2 3/8	1/2	10 1/4
0026-T	1	6 3/8	1 1/8	4 1/2	3 15/16	8 5/8	2 15/16	1	13 1/4
0026-O	1	6 3/8	1 1/8	4 1/2	3 15/16	7 1/16	2 15/16	1	12 1/4
026-T	1 1/4	8 5/16	2 1/2	5 1/8	5 5/8	10 1/2	3 1/8	1 1/4	19
026-O	1 1/4	8 5/16	2 1/2	5 1/8	5 5/8	8 7/16	3 1/8	1 1/4	17 1/2

Table VII. Recommended Ratings of Webster Series 26 Float-and-Thermostatic Traps in Lbs. Water per Hour

Size Inches	Symbol	Pressure Difference Across Trap in Lbs. per Sq. In.								
		1/8	1/4	1/2	3/4	1	2	5	10	15
3/4	00026-T and O	50	70	100	120	140	200	210	220	230
1	0026-T and O	125	175	250	300	350	500	525	550	575
1 1/4	026-T and O	300	425	600	735	850	1200	1260	1320	1380
1 1/2	126-T and O	600	850	1200	1470	1700	2400	2520	2640	2760
2	226-T and O	1250	1775	2500	3060	3550	5000	5250	5500	5750

Conversion Factors: To convert ratings given in lbs. per hour of water to sq. ft. e.d.r. at 240 B.t.u., multiply by 4. Ratings are in accordance with standards recommended by the Steam Heating Equipment Manufacturers Association, providing for the continuous elimination of air when the trap is operating at its maximum rating.

Webster Nesbitt UNIT HEATERS

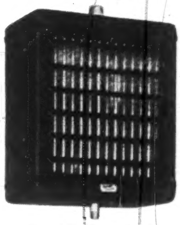


Fig. 27. Standard Propeller-Fan Unit

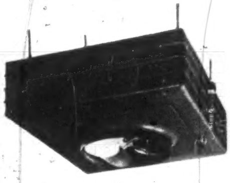


Fig. 28. Little Giant Down Blow Unit

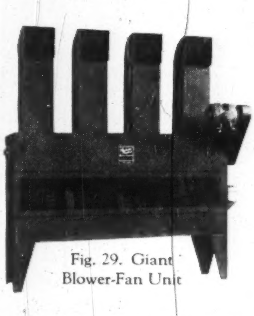


Fig. 29. Giant Blower-Fan Unit

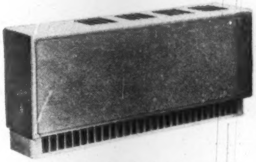


Fig. 30. Series R Unit Heater

Webster-Nesbitt Unit Heaters with non-ferrous heating elements are manufactured by John J. Nesbitt, Inc., Philadelphia, Pa., and are distributed solely through Warren Webster & Company, Camden, N. J.

Webster-Nesbitt Unit Heaters are designed to circulate large volumes of air at comparatively low temperatures. The heated air is mixed thoroughly with the room air to reduce overheating in upper areas and to assure quick heating, low fuel cost, and greater comfort.

Air Ratings are based on tests made in accordance with the Standard Test Code of the I.U.H.A. and the A.S.H.V.E.

GUARANTEE: Webster-Nesbitt Unit Heaters are guaranteed to be of capacities stated in printed publications and to be free of original defects in material or workmanship, for one year from date of factory shipment.

Any part found to be defective within this period will be repaired or replaced, f.o.b. factory, at manufacturer's option. Webster-Nesbitt shall not be held responsible for any charges involved in the removal or replacement of material at the place of operation or for any consequential damages arising out of failure.

Guarantee on motors, switches, controls, or accessory equipment, shall be limited strictly to the guarantee of the original maker.

For complete rating tables, dimensions and application data, communicate with the nearest Webster office.

Standard Propeller-Fan Unit Heaters

Webster-Nesbitt Standard Propeller-Fan Unit Heaters provide a proved method of heating small and medium size enclosures such as stores, offices, garages, factories, and other structures having comparatively low ceilings.

Range of Sizes: Heating capacities from 34,700 B.t.u. to 338,000 B.t.u., basic rating of 2 lbs. steam pressure and 60 degrees entering air.

Quiet Operation: Fans impart a gradual acceleration to the air stream. Ample spacing is maintained between the fan and heating element. Motors of sleeve bearing type, equipped with isolators. All these factors contribute toward quietness of operation.

Heating Elements: Extended fin-and-tube type, constructed of copper condensing tubes and aluminum plate-type fins. Low temperature heating elements available for higher steam pressure.

Modern Casing Design: Heavy furniture steel casings, die-formed, electrically welded, a sturdy, integral unit. Black featherweave finish. Compact, suspended type. Publication W-N 126.

Series R Unit Heaters

The Series R Unit Heater is a neat furniture steel cabinet enclosing a copper-tube, aluminum-fin heating element adaptable for steam or forced hot water systems; and two or more centrifugal fans belt-driven from an electric motor: a universal design offering wide flexibility.

This unit is especially adaptable for use where low noise levels are desirable. A variable-pitch motor sheave permits operation of fans at decreased speed. Adjusted to higher speed, these units are suitable for commercial or industrial applications, producing an exceptionally high heating capacity. Available in four sizes, with from two to five fans, for vertical, horizontal, wall, and inverted installations.

Air deliveries with standard drive range from 518 to 1890 c.f.m. Steam heating capacities at basic rating conditions range from 158 e.d.r. to 588 e.d.r. Publication W-N 133.

Giant Blower-Fan Unit Heaters

Made in Standard; Thermadjust; and Valve-Control Types.

Standard Type (Non-Thermadjust): Used principally where heating is by recirculation only, and where constant heat-output is desired during period of operation. Start-and-stop control is manual, or through thermostat.

Thermadjust Type: Employs dampers in front of casing and over face of heating element, to provide mixing of unheated and heated air, producing heat output in accordance with requirements, and continuous circulation of air volume.

Valve-Controlled Type: Standard casing arrangement, equipped with Nesbitt Heating Surface with steam-distributing tubes, for automatic control of heat output by modulation of steam supply.

Capacities: Ranging from 101,000 B.t.u./hr., 2450 c.f.m., to 930,000 B.t.u./hr., 15,000 c.f.m. (basic ratings, 60 deg. entering air, 2 lbs. steam pressure).

Sizes: Eight casing sizes. Discharge velocities, 1785 to 2110 f.p.m. Low temperature radiators for applications employing high steam pressure. Mounting: Floor-mounted; horizontal-suspended; wall-mounted; inverted. V-belt drives.

May be equipped with recirculating and outdoor air connections, mixing boxes, dampers, and wall boxes. Publication W-N 128.

Little Giant Unit Heaters

For efficient, economical heating of all types of industrial and commercial buildings. Seven basic sizes, each with choice of two (some, three) heating elements.

The three smaller sizes are blow-through type: propeller fan discharges air *through* the heating element. These units have a lower outlet velocity, are generally intended for lower mounting heights of commercial jobs.

The four larger models are draw-through type: fan is located on *discharge* side of heating element. This produces high discharge velocities necessary when units are located well above floor, or must blow long distances. Draw-through Little Giants have performance characteristics comparable with those of blower-fan unit heaters; are available in down-blow or horizontal-blow types.

Additional advantages: efficient motor and fan assemblies; non-ferrous all-purpose heating elements, for steam pressures up to 200 lbs. gauge, saturated; sturdy casings of modern design; black featherweave finish.

Heating capacities from 28,500 B.t.u. to 348,000 B.t.u., basic steam ratings. Publication W-N 134.

Webster HEATING SYSTEM CONTROLS

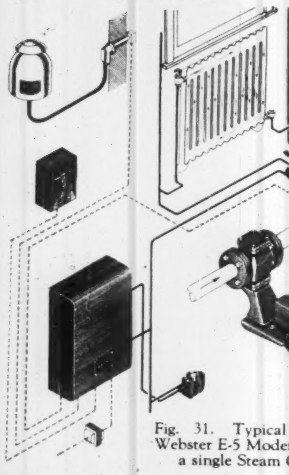


Fig. 31. Typical arrangement of Webster E-5 Moderator System using a single Steam Control Valve.

Webster E-5 Electronic Moderator System

The Webster E-5 Electronic Moderator System is an electrically-operated central control providing continuous but automatically graduated or throttled steam flow to orificed radiators. An Outdoor Thermostat automatically varies the rate of steam delivery to radiators with changes in outdoor temperature. A Variator, manually operated, modifies the action of the Outdoor Thermostat for such requirements as quick heating-up, changes in occupancy, and weather conditions other than temperature.

The Webster Electronic Moderator Control is suitable in general for medium to large sized buildings heated by two-pipe Webster orificed systems using low pressure steam from any source.

Webster EH-10 Moderator System

The Webster EH-10 Moderator System is a central heat control of the "pulsating flow" type for new or existing steam or hot water heated small and medium sized buildings. May be applied to directly control operation of burner, stoker or blower, or to a Webster Control Valve placed in the steam supply main. Automatic heat variation is accomplished by an Outdoor Thermostat. Control Cabinet provides supplemental manual control when desired.

Like other Webster Moderator Systems, the EH-10 may be applied to open return systems using boiler return trap or condensate pump, and to vacuum return systems.

Webster EH-30 Moderator System

The Webster EH-30 Moderator System is a custom-built, multi-zone, pulsating flow control specifically designed to meet the requirements of large groups of buildings heated from a central steam plant. Write for technical paper, "Heating Control at the University of Notre Dame."

Webster Continuous Flow Control for Hot Water Heating

Webster Continuous Flow Control for forced circulation Hot Water Heating Systems employs Outdoor Thermostat and Variator to control throttling-type valve or directly control oil burner, gas control or stoker motor. Water flows continuously through the system. Heating is continuous and adequate. For Baseboard, Convector, Radiator or Panel Heating.

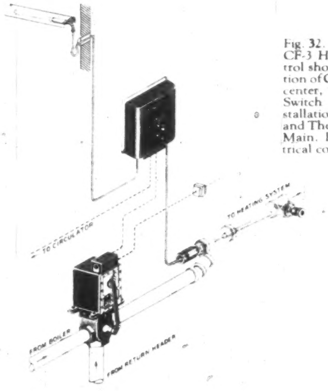


Fig. 32. Arrangement of Webster CF-3 Hot Water Heating Control showing, upper left, installation of Outdoor Bulb with Shield; center, Control Cabinet with Switch and Variator; below, installation of Supply Main Bulb and Thermometer Well in Supply Main. Dotted lines indicate electrical connections.

Webster Control Valves

Webster Main Steam Control Valves (Type E-1N) are used with Webster Moderator Systems, one valve for each zone controlled. Will throttle steam supply to maintain the proper pressure differential in the system. May also be used for shut-off service. Stock sizes 2″ to 8″. 10″ and 12″ on special order. Bulletin B-291 gives full details.

Webster Motorized Shut-Off Valves for shut-off service in low-pressure Webster Steam Heating Systems and in forced circulation hot water heating. Used for zoning in Webster Baseboard Heating, either by manual switch or thermostat. Symbol 63BCA made in ½″, ¾″ and 1″ sizes. Symbol V-20-A made in 1¼″, 1½″ and 2″ sizes. Bulletin B-290 gives full details.

Webster M-INA Control Valve is a three-way throttling or mixing valve designed for use in Webster Continuous Flow Control for Hot Water Heating. Passes hot water from the boiler into the supply main if the outdoor thermostat indicates a greater demand; reduces the amount of hot water added if the recirculated water from the system is sufficiently warm. Made in ½″, ¾″, 1¼″, 2″, 2½″, 3″ and 4″ sizes. Bulletin B-200A gives full details.

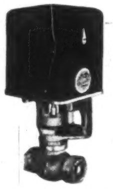


Fig. 33. Webster Motorized Shut-Off Valve (Series 63 BCA).

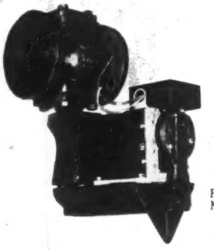


Fig. 34. Webster Type E-1N Control Valve equipped with auxiliary switch actuated by cam.

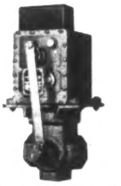
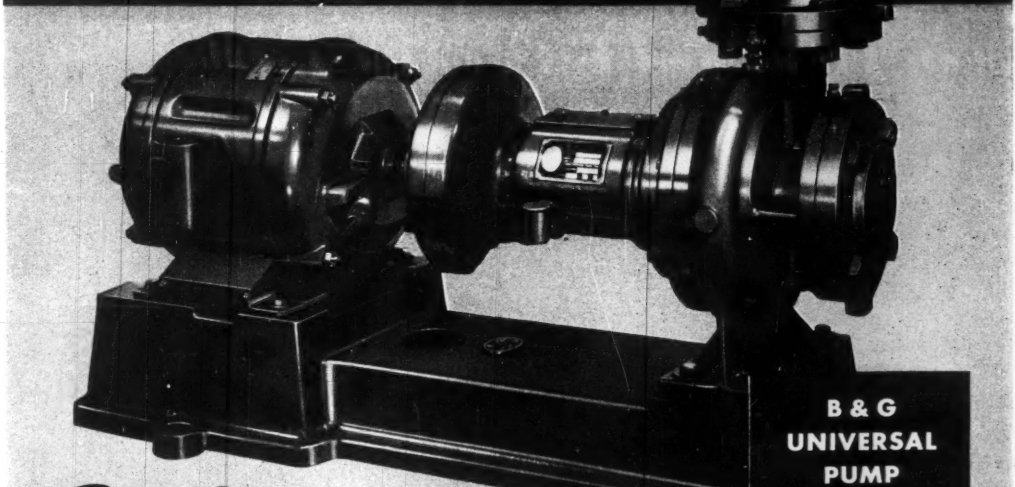
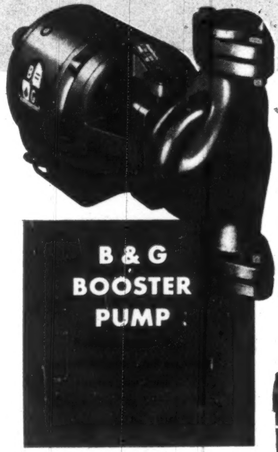
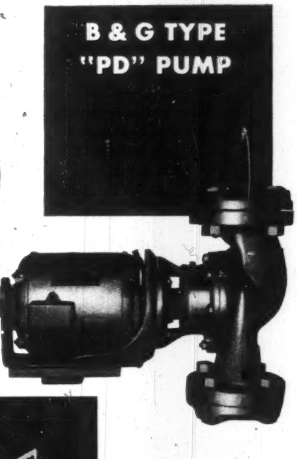


Fig. 35. Webster Type M-INA Hot Water Heating Control Valve.

You can do a Better Job







In any B & G *Hydro-Flo* Pump you buy, regardless of size, you will find all the basic features which have made this line of pumps preferred by specifiers and installers of heating equipment.

B & G Boosters and Universals are not just ordinary centrifugal pumps. They are designed and built specifically for heating system application. That's why they are *quiet*—that's why they operate on a minimum of power. B & G Pumps have consistently proved their efficiency and dependability—thousands have been in operation for many years without need for service of any kind.

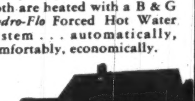
And that's why more B & G Hydro-Flo Pumps are sold than any other built for the same purpose!

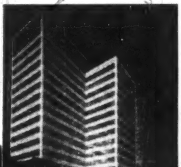
Whether you are planning the heating of a cottage, a factory or a wide-spread garden apartment, remember that B & G Pumps are available in sizes closely matched to the pumping requirement.

For full information, send for the B & G Catalog.

No job too big or too small for B & G *Hydro-Flo* Heating Pumps

Contrast the sizes of this low-cost housing unit and the twenty-story building beside it. Both are heated with a B & G *Hydro-Flo* Forced Hot Water System . . . automatically, comfortably, economically.





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"We have to know that this new mine is going to do its job even after riding for hours under the belly of a plane or being stored long periods in sub-zero temperatures," said R. E. Hightower, chief of the Technical Evaluation Department, Naval Ordnance Laboratory, White Oak, Maryland. The desired temperature and humidity conditions are precisely provided by Worthington refrigeration. Contractor, Arthur E. Magher Co., N.Y., N.Y.

They're Checking Ordnance at 65° Below!

You see, that cylindrical object is a mine. The masks keep faces from freezing as the Navy studies icing effects to be certain that neither ice nor stiffened parts will affect its operation when dropped from a sub-zero atmosphere into the ocean.

These studies are made in the new stainless steel temperature simulation chamber at the Naval Ordnance Laboratory, White Oak, Maryland, where ordnance equipment can be subjected to temperatures from 200 above to 100 below zero, Fahrenheit, with any desired humidity.

The naval laboratory uses a Worthington brine cooling system composed of one centrifugal compressor and four reciprocating compressors to reduce the temperature of the chamber to minus 100 F.

This is but one of many military low-temperature installations where Worthington products are helping to insure that our armed forces get the best equipment in the world.

The knowledge and experience which has made Worthington a leader in this field is available to you for any type of air conditioning or refrigeration installation. Consult Classified Telephone Directory for nearest Worthington distributor. Worthington Pump and Machinery Corporation, Air Conditioning and Refrigeration Division, Harrison, N. J., specialists in air conditioning and refrigeration for more than 50 years.

A.1.4

WORTHINGTON

AIR CONDITIONING AND REFRIGERATION

THE MOST COMPLETE LINE... ALWAYS THE CORRECT RECOMMENDATION

THE UPJOHN COMPANY's new manufacturing building in Kalamazoo, Michigan. Auditorium, cafeteria, employee lounge and offices are air conditioned and use Kno-Draft *Adjustable* Air Diffusers throughout. *The Austin Company, Engineers and Builders.*

no one
ever felt a draft...

from a kno·draft adjustable air diffuser

No. 1 reason why so many Kno-Draft *Adjustable* Air Diffusers are being specified and installed these days is because they do their job right. Soundly engineered and uncomplicated in operation, they distribute air evenly and *without drafts.*

No. 2 reason is beauty. Dynamically simple in design, Kno-Draft *Adjustable* Air Diffusers are "at home" in any surroundings—whether left in their natural spun aluminum finish or painted to match the ceiling.

No. 3 reason is adjustability *after* installation. This saves an enormous amount of slide rule figuring. A simple screw-driver adjustment balances temperature and air distribution throughout the conditioned area.

No. 4 reason is customer satisfaction. Users *like* the results they get with Kno-Draft *Adjustable* Air Diffusers. There are types and sizes to meet every need.

NEW EDITION! KNO-DRAFT DATA BOOK now in new 32-page format. Complete up-to-the-minute specifications, engineering and installation data on Kno-Draft *Adjustable* Air Diffusers. Bring your files up to date. Mail coupon today.

TRADE MARK "KNO-DRAFT" REG. U. S. PAT. OFF.

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Company..........
Street..........
City.......... Zone.......... State..........

How Honeywell "Customized" Temperature Control Helps Provide Year-Round Comfort in Bonwit Teller's New Chicago Store

Specially designed system easily handles control problems created by variety of room sizes, exposure, use and occupancy differences

The main salon, pictured below, dramatically demonstrates the kind of atmosphere Bonwit Teller, Chicago, offers customers on the city's swank north side.

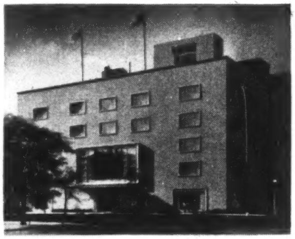
And it dramatically demonstrates, too, the reason why the Chicago architectural firm of Shaw, Metz and Dolio specified Honeywell Customized Temperature Control when designing the store.

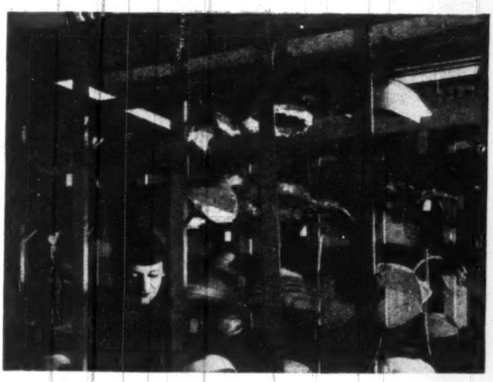
At the southern end of this spacious salon on the second floor, the striking ceiling-to-floor window is exposed to icy winds in winter—and the hot sun in summer. A separate thermostat in this area compensates for the problems created by these exposure and weather factors.

Other thermostats in other areas of the second floor, as indicated on the plan, are especially important in meeting the comfort demands of smaller sized rooms. These have different use, occupancy and exposure problems.

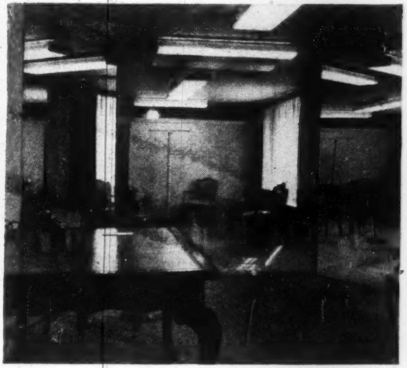
How custom temperature control easily meets these problems is highlighted by the other interior views.

The heating plant and air conditioning were installed by William Adams Engineers, Inc., Chicago; Ventilating by R. B. Heyward Co., Chicago; George A. Fuller Company, Chicago, was the general contractor.

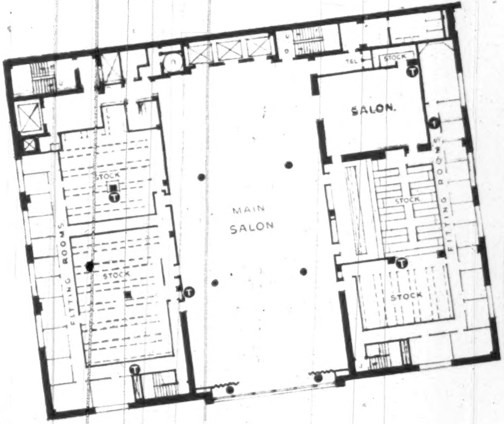


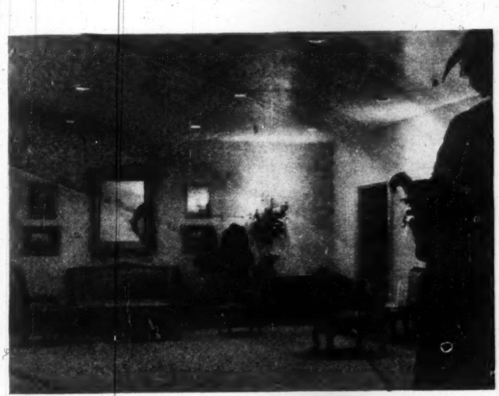


Stock rooms offer a real opportunity for important savings — if a store is equipped with Honeywell Customized Temperature Control. Take the room where hats are stored, for instance. Because no patrons and few employees enter here, it's unnecessary to maintain as high temperatures in winter as in other parts of the store. In summer the reverse is true. This saves fuel in winter — and refrigerated air in summer.



If the fitting rooms were controlled by a thermostat located in the main salon, customers changing their clothes here would be uncomfortably cool much of the time. But Honeywell Customized Temperature Control — with a separate thermostat system in the fitting rooms — maintains the right degree of warmth all the time.





A separate thermostat system provides customers who patronize the fur salon, pictured above, with the *special* degree of comfort *they* need. And so it goes throughout Bonwit Teller, Chicago. As Robert Marriner, the store's engineer and superintendent, says: "Summer and winter, we've got the most comfortable store in town. Both customers and employees will back me up on this. And with our Honeywell customized controls, maintenance is no problem at all."

For real comfort in public buildings, use Honeywell Customized Temperature Control

Whether it's a store, office, school, garage — or *any* public building, there's a Honeywell customized control system to meet your client's heating and ventilating problems.

Once equipped with a Honeywell Customized Temperature Control System your clients will have the newest, finest system available. And they'll have the right kind of controls to keep employees and customers comfortable — while saving fuel.

And you'll have better satisfied clients.

So for full facts on Honeywell Customized Temperature Control call your local Honeywell office. There are 91 across the nation. Learn how custom control can help your clients and *your* business. Or mail the coupon today.

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I'm interested in learning more about your Customized Temperature Control Systems for public buildings.

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Address ________________________________
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In Motor Courts too!
for Comfort Heating it's Sarcotherm

TOM SAWYER
Motor Inn
AND RESTAURANT

Tom Sawyer Motor Inn, Albany, N. Y., 100 rooms with 100 baths. Highly rated by A.A.A. Radiant Heating System, designed and installed by LeVally-McLeod, Inc. of Albany, includes 5 zones—completely Sarcotherm equipped.

1. Main Lobby and Registration Desk at Tom Sawyer Motor Inn.

2. Friends meet at the main entrance in the atmosphere of an exclusive country club.

Today the luxurious motels which are rapidly displacing the old overnight cabins along our highways from coast to coast, include central heat among the hotel comforts offered.

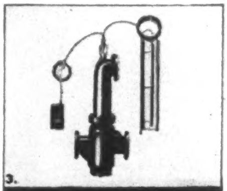
Heating of the one-story, spread-out buildings is usually by forced hot water or radiant means, for which

SARCOTHERM

weather-compensated temperature control with continuous circulation is unequalled.

We have pioneered in this field and our experience is at the disposal of architects and engineers who are designing motor courts and wish to include the latest in automatic heating. Here are a few of the Motels recently equipped with Sarcotherm Controls:

Newberry Motel, Russelville, Ky.
Miami Courts Tourist Cabins, Salisbury, Md.
Hotel Sleep, Rahway, N. J.
Garden Motor Lodge, Troy Hills, N. J.
Dutch Maid Motor Lodge No. 2, Woodbridge, N. J.
Smith's Tourist Court, R.F.D., Lynchburg, Va.
Van Winkle Motel, Everett, Washington
Snyder's Court, North Bend, Washington
Leonard Auto Court, Parkland, Washington



3. The heart of the Sarcotherm control system for radiant or forced hot water heating is this unique control valve. It is actuated by liquid expansion thermostats, one located outside the building and one in the valve itself. Between them they anticipate changes in heat loss ratio, thus maintaining comfort temperatures under all conditions.

4. The Sarcotherm Comfort Control "Thermoray" is an extremely sensitive thermostat affected by both radiation and convection.

•

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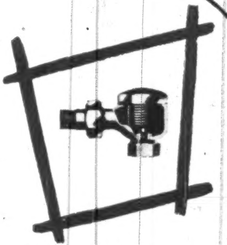
A SARCO PRODUCT

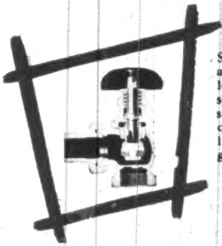
23

Schools from Coast to Coast

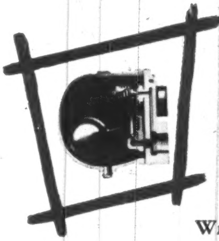
Here are just a FEW of the schools built during 1950-51, equipped with SARCO HEATING SPECIALTIES



Sarco Radiator Trap, type H, for 30 years the standard on all types of two-pipe steam heating systems. Sizes ½" to 1", angle, straightway, offset and vertical styles.



Sarco Radiator Valve, available in spring-packless style as illustrated; also in the bellows-packless style. Sizes ½" to 1½", quick opening and modulating types; angle or globe.



Sarco Float-Thermostatic Trap, type FTL for end-of-main and riser drips; also unit heaters and hot water generators. Fitted with Sarco thermostatic air vent. Air binding is impossible.

Write for Catalog 151.

State	*City*	*School*
California	Westwood	U.C.L.A.—Geology and Chem. Bldg.
Connecticut	Danbury	Park Avenue School
Connecticut	New Haven	Winchester Elementary School
Connecticut	Wilton	Wilton Junior High School
Florida	Haines City	Junior-Senior High School
Idaho	Coeur D'Alene	Coeur D'Alene School
Illinois	Freeport	Junior High School
Illinois	Lincolnwood	Lincolnwood Elementary School
Illinois	Wauconda	Wauconda Township High School
Indiana	Mishawaka	Bremen School
Iowa	Cedar Rapids	Buchanan Elementary School
Louisiana	Bogalusa	Bogalusa High School
Maryland	Baltimore	Edison-Barton-Mergenthaler High School
Massachusetts	Taunton	New School for Feeble Minded
Michigan	Galesburg	Galesburg School
Mississippi	Gulfport	Northeast Ward Elementary School
New Hampshire	Lebanon	Canaan Elementary School
New Jersey	Lakewood	Public School No. 5
New Jersey	Newark	Dayton Street School
New Jersey	Passaic	Grant School No. 7
New York	Bronx	Junior High School No. 125
New York	Brooklyn	Junior High School No. 14
New York	New York	Public School No. 192
New York	Roslyn	East Hills Elementary School
New York	Stony Brook	Stony Brook Elementary School
North Carolina	Lumberton	Pembroke-Rowland School
Ohio	Cleveland	Case Institute of Technology
Ohio	Lyndhurst	Anderson Road School
Oregon	Eugene	Eugene High School
Pennsylvania	Annville	Lebanon Valley College
Pennsylvania	Franklin County	Mainsville Elementary School
Pennsylvania	Williamsport	Williamsport Jr. High School
Pennsylvania	York	York Township Elementary School
Tennessee	Nashville	Gallatin High School
Texas	Austin	Casis School
Texas	Waco	Waco High School
Utah	Salt Lake City	West High School (Gymnasium)
Washington	Richland	Chief Joseph High School

and many, many other schools

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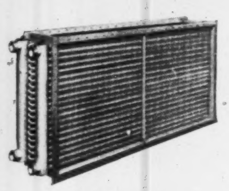
EMPIRE STATE BUILDING, NEW YORK 1, N. Y.
Represented in Principal Cities
SARCO CANADA LTD., TORONTO 5, ONTARIO

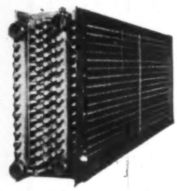
ALWAYS SPECIFY SARCO 354

SMART DECISION!

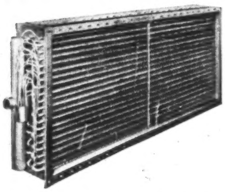
AIR CONDITIONING COILS



WATER COIL
For Cooling and Heating, 1 to 10 rows deep.

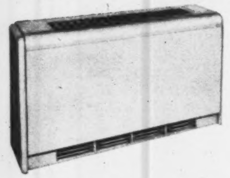


CLEANABLE TUBE WATER COIL
Removable Plug Type, 1 to 10 rows deep.

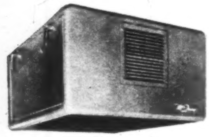


DIRECT EXPANSION COIL
For Cooling, 1 to 8 rows deep.

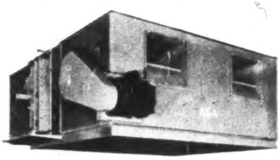
AIR CONDITIONING UNITS



SEASONMAKER—(FLOOR)
Also available in basic or ceiling types, 3 sizes 200 cfm, 400 cfm and 600 cfm.

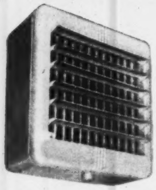


"RH" AIR CONDITIONER
2 to 10 Ton Models—For use with hot or cold water, steam or direct expansion in small commercial applications.

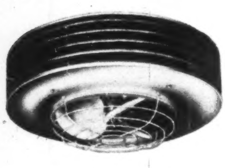


(SUSPENDED MODEL)
AIR CONDITIONER
Type "A" Central Station Air Conditioners for large industrial and commercial applications.

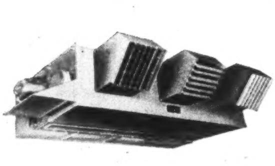
UNIT HEATERS



HORIZONTAL UNIT HEATER
Nominal Capacity range 20,300 to 360,000 Btu's.



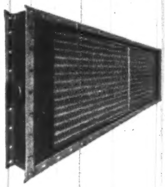
DOWN FLOW UNIT HEATER
Nominal Capacities from 25,400 to 500,000 Btu's.



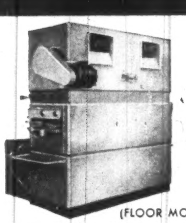
(SUSPENDED MODEL)
BLOWER TYPE UNIT HEATER
Nominal Capacities from 20,600 to 1,600,000 Btu's.

SPECIFY McQuay

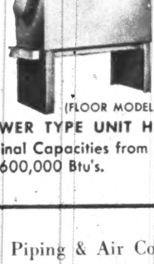
TO INSURE CUSTOMER SATISFACTION



"BLAST" HEATING STEAM COIL
For Heating, 1 or 2 rows deep, using low or high pressure steam.



(FLOOR MODEL)
AIR CONDITIONER
Type "A" Central Station Air Conditioners for large industrial and commercial applications.



(FLOOR MODEL)
BLOWER TYPE UNIT HEATER
Nominal Capacities from 20,600 to 1,600,000 Btu's.

Proved and Preferred!

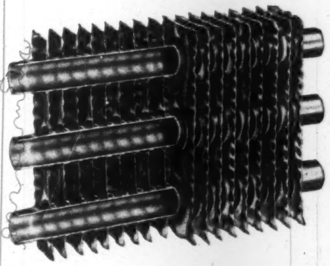
You, and your customers too, are money ahead when you specify McQuay . . . because McQuay products are proved and preferred—for their efficiency, economy of operation, and the way they stand up under long hard use.

Join the growing list of architects, engineers and contractors who depend upon McQuay to satisfy all of their heating and air conditioning requirements. Quality and price comparisons will convince you that it pays to specify from McQuay's complete line—pays in profits from the job and in customer satisfaction.

NEW RIPPLE-FIN COIL CONSTRUCTION

Only McQuay gives you Ripple-Fin surface—the product of years of research aimed at producing the ultimate in heat transfer for any weight of metal. High efficiency is assured by forcing the air to follow an ever-changing direction of flow in passing through the coil. Thus air repeatedly contacts coil surface to give maximum contact time, maximum contact velocity, and a resultant optimum heat transfer.

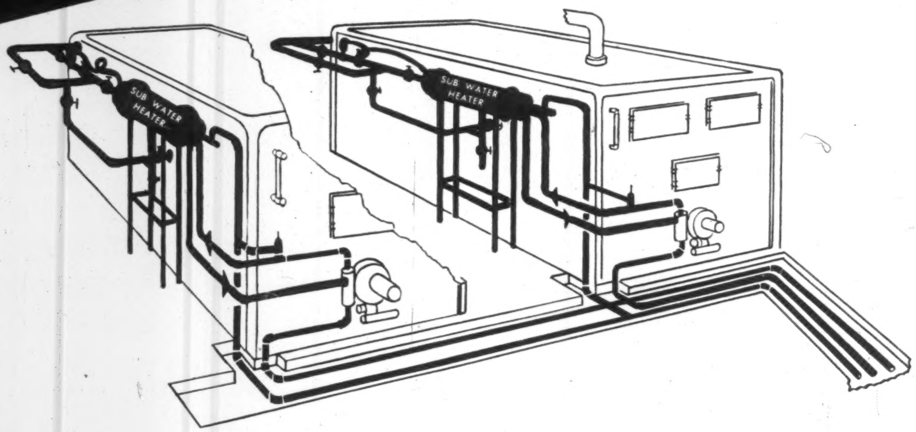
With this advance in design, McQuay retains the staggered tube and the McQuay rippled edge features so well known in the industry, and which contribute greatly to higher heat transfer, construction ruggedness, and eye appeal.



McQuay INC.

HEATING
AIR CONDITIONING
REFRIGERATION

1601 BROADWAY STREET, N.E. • MINNEAPOLIS 13, MINNESOTA



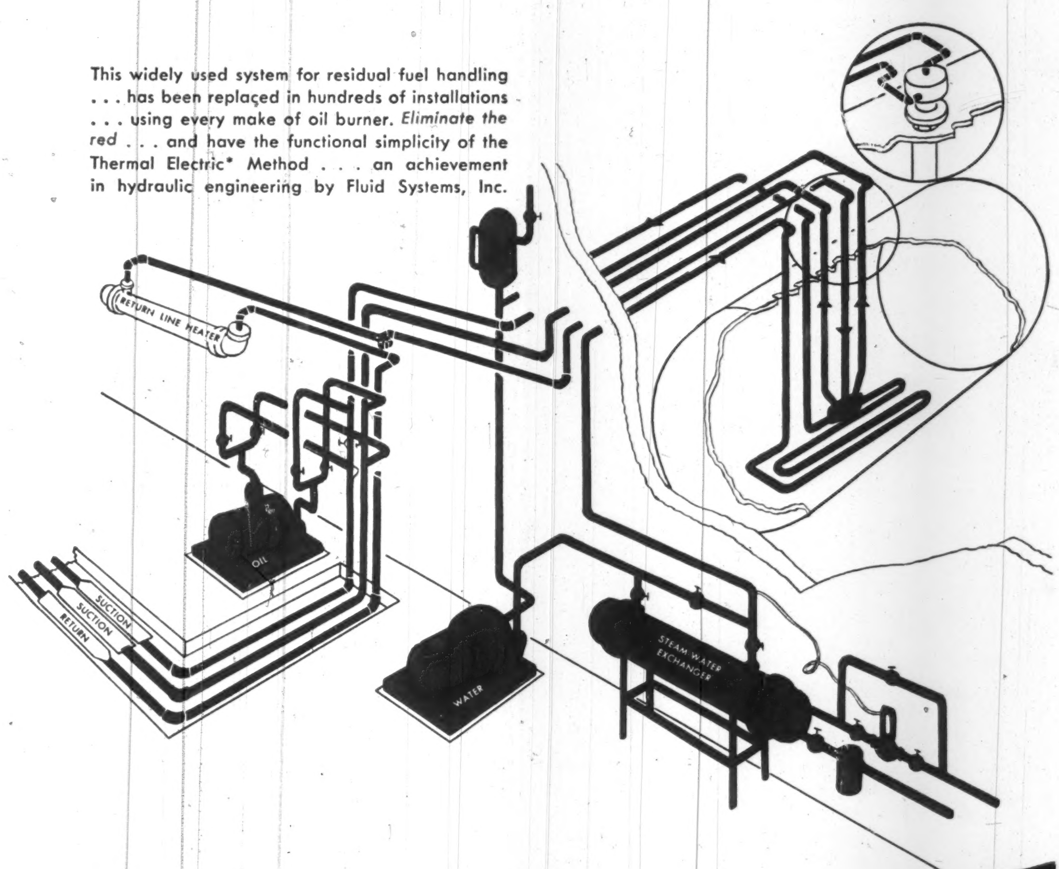
Short Cut

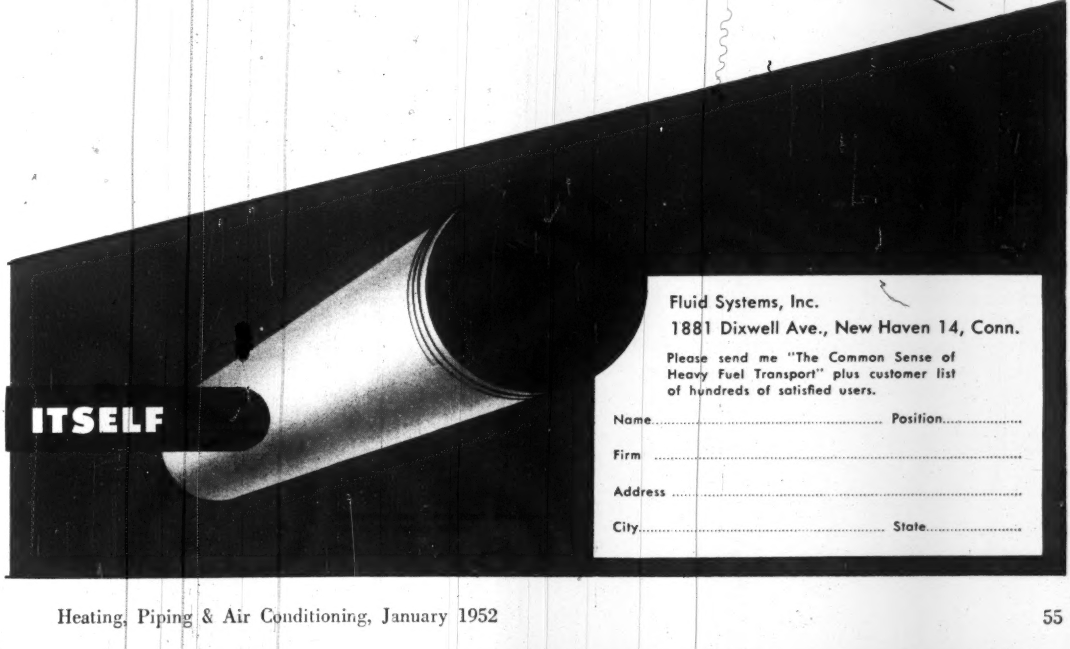
TO OIL BURNER ECONOMY

Unheated underground storage. The hazards and costs of steam or water coils are removed . . . stratification eliminated. Sub-water heaters and recirculation eliminated. Smaller pipe sizes. Remote pump eliminated for a majority of installations. And the exorbitant fuel costs of constant or cycle circulation radically reduced.

THE PIPELINE THAT HEATS

This widely used system for residual fuel handling . . . has been replaced in hundreds of installations . . . using every make of oil burner. *Eliminate the red* . . . and have the functional simplicity of the Thermal Electric* Method . . . an achievement in hydraulic engineering by Fluid Systems, Inc.

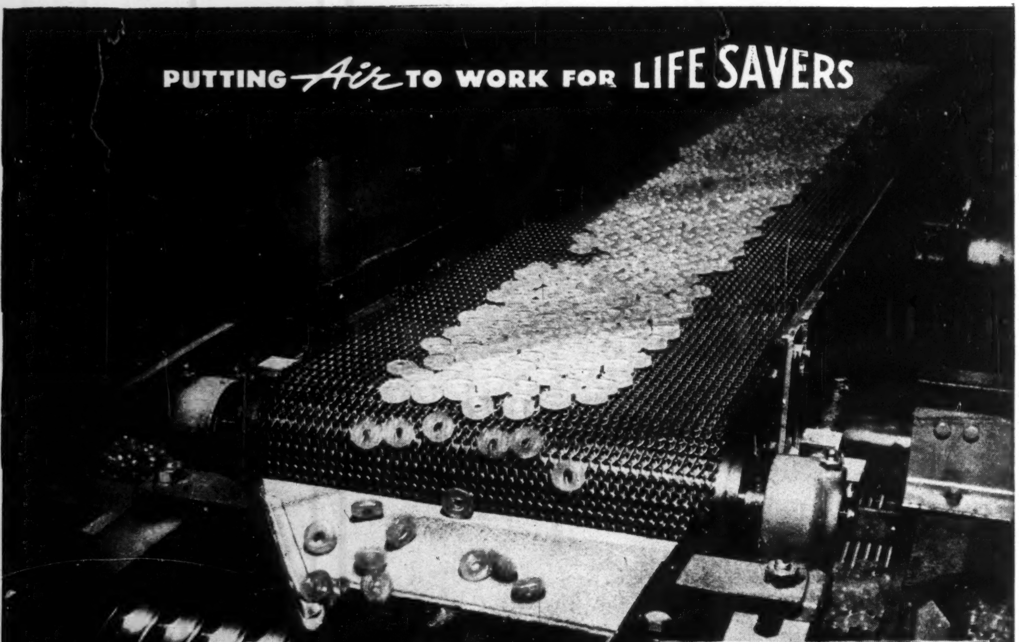

RETURN LINE HEATER
OIL
SUCTION
SUCTION
RETURN
WATER
STEAM WATER EXCHANGER



Fluid Systems, Inc.
1881 Dixwell Ave., New Haven 14, Conn.

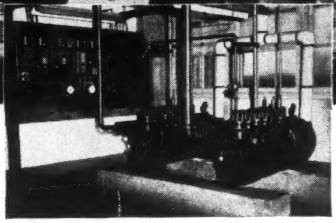
Please send me "The Common Sense of Heavy Fuel Transport" plus customer list of hundreds of satisfied users.

Name.. Position....................
Firm ....
Address ....
City.. State.........................



PUTTING *Air* TO WORK FOR LIFE SAVERS

Air Conditioning by: J. P. Salmini Co., Inc., Bridgeport, Conn.



Westinghouse Compressors are the heart of this cooling system. Hermetically sealed for maximum dependability.

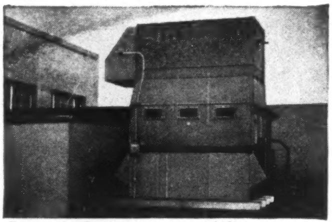
COOL AIR

STEPS UP A FLAVOR PARADE

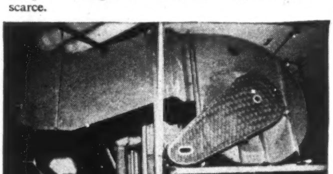
At Life Savers, intricate machines stamp out the familiar "candy with the hole"—3,600 a minute! When formed, the candy drops are soft and pliable. During the critical next few minutes, they must be cooled quickly and evenly.

Westinghouse equipment *puts air to work* for Life Savers by providing chilled air through which the candy drops travel on conveyor belts. In addition, the candy production department is air conditioned. Clean, cool air conditioning by Westinghouse assures the uniform quality for which Life Savers are famous the world over.

There's Westinghouse Air Conditioning equipment specifically designed to make air work *for you* in processing operations . . . whether it's air conditioning, air handling or air cleaning. Call the Westinghouse Air Conditioning Distributor in your classified phone directory, or write Westinghouse Electric Corp., Air Conditioning Division, Hyde Park, Boston 36, Mass.



Evaporative Condensers save up to 90% in water consumption. Designed for installation where water is scarce.



Silentvane® fans handle large volumes of air. Specially designed blade wheel delivers non-pulsating air flow.

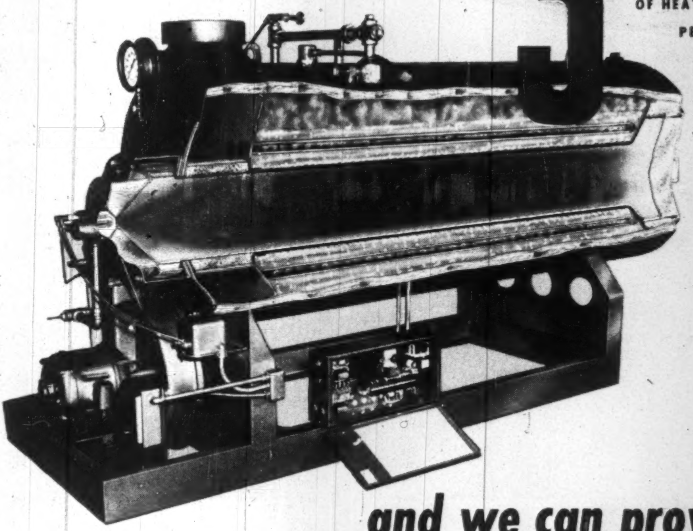
YOU CAN BE SURE . . . IF IT'S

Westinghouse

J-80219

we'll do the job with 3 sq. ft.

OF HEATING SURFACE PER B.H.P.



and we can prove it!

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EXPORT

Drake American Corporation
New York, New York

with CYCLONIC COMBUSTION

WE REPEAT! Through the principle of *patented* CYCLONIC COMBUSTION, CYCLOTHERM packaged steam generators will produce maximum heat transfer on *any* job . . . *any* application . . . with only 3 square feet of heating surface per B.H.P. That is not an advertising claim—we are stating a fact— *backed by our unconditional guarantee!*

This remarkable performance is based on a revolutionary advance in the principles of heat transfer. In the Cyclotherm unit, the air enters the combustion chamber at a high velocity, and mixing with the fuel is made to *spiral in a revolving vortex* along the entire length of the furnace. This controlled spiral is actually cyclonic in motion. This intensely luminous flame transfers heat to the fire tube both by radiation and convection, resulting in an unusually high rate of heat transfer. *There are no hot spots!* The efficiency of the Cyclotherm principle plus the ingenuity of Cyclotherm design calls for 3 square feet of heating surface per B.H.P. required—*and no more!*

The Cyclotherm meets all state requirements and is built in accordance with A.S.M.E. and National Board Standards and bears the label of UNDERWRITERS LABORATORIES, INC.

Full power operation from a cold start in 15 to 20 minutes. Savings up to 50% on maintenance. Great fuel operational savings.

Boilers are designed for oil or gas operations from 18 thru 500 h.p., 15 to 200 lbs. operating pressure.

Details of these and many other facts regarding Cyclotherm generators are available by writing Dept. N.

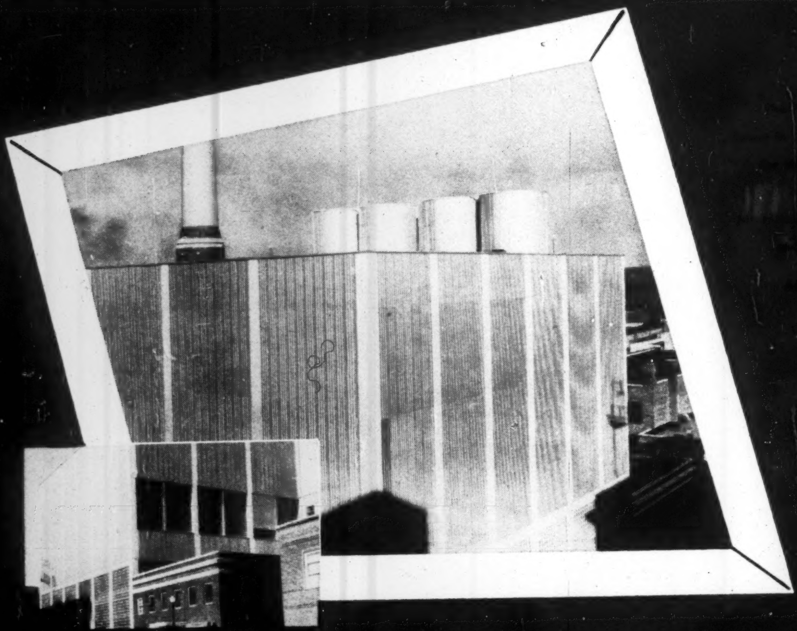
***MORE POWER** per operating dollar*

see our CATALOG in SWEET'S FILE ARCHITECTURAL

CYCLOTHERM
STEAM GENERATORS
OSWEGO, NEW YORK

The Big 3 Comfort Air Conditioning

The Biggest



[illegible]

The Highest

[illegible]

Towers of 1951 — All Built by PRITCHARD!

The "Big 3" *comfort* air conditioning cooling towers of 1951 had many things in common. Each tower is the critical "heart" of the system it serves—a heart which must function for many many years with unfailing reliability. Each tower was engineered by Pritchard to meet widely varying individual specifications and operating conditions. And each tower installation had these major considerations throughly engineered for specific function:

Sound Control • Ice Formation • Fog Dissipation
Condensate Control • Drift Elimination

Algae Control • Bacteria Control • Fungi Control

Thermal Capacity • Mechanical Reliability

Architectural Appearance • Operating Flexibility
Maintenance Facility

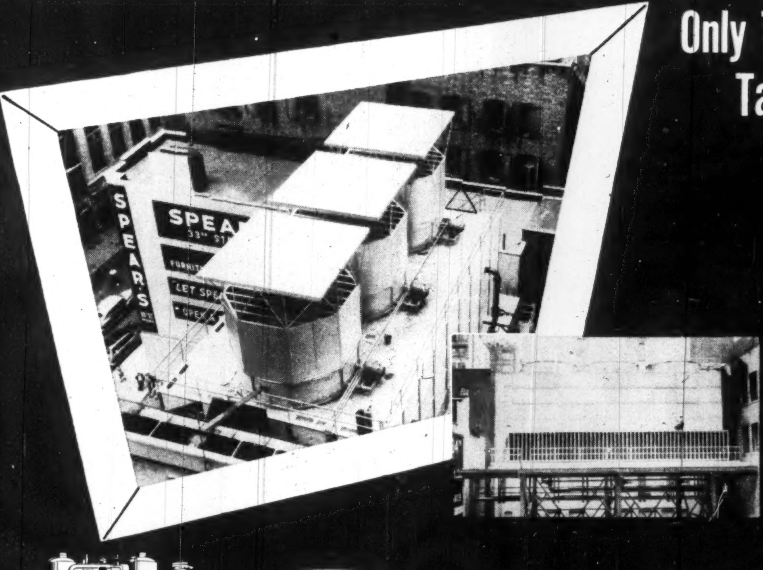
Personnel Safety • Insurability • Fire Hazards
Material Compatibility • Structural Stability
Building Code Conformance

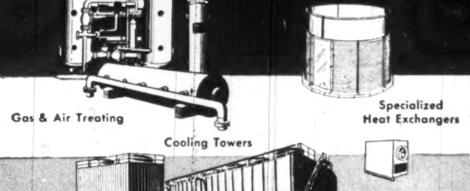
The fact that these problems were all resolved to the satisfaction of all concerned is outstanding evidence of Pritchard's ability to coordinate architectural treatment, mechanical equipment, engineering "know-how" and modern construction methods into an *outstanding* cooling tower installation.

Regardless of the complexities of your cooling tower problem, you can rely on Pritchard's proven experience and ability in this field.

We invite your specific inquiry.

Only Tower for World's Tallest Building





Producers of QUALITY Specialized Process EQUIPMENT

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EQUIPMENT DIVISION
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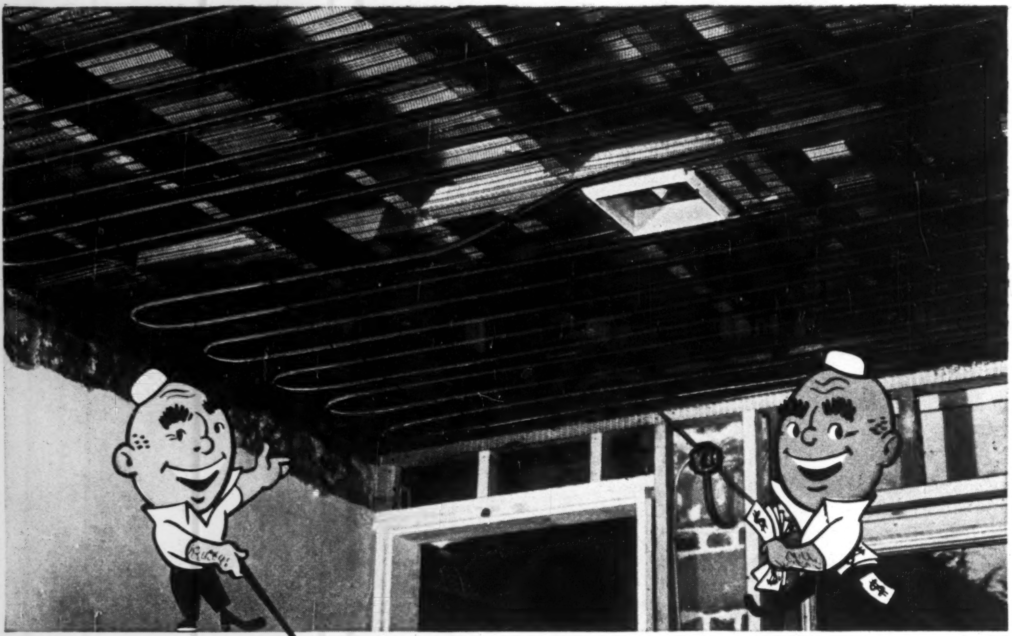


Get better radiant heating systems, savings, too, with Bundyweld Tubing

Take those ceiling installations for instance. With Bundyweld you can pare fabrication costs, cut installation time, get reliable, money-saving performance year in, year out.

At your shop or building site, you easily, safely bend standard twenty-foot lengths of ductile Bundyweld into coils. No structural collapse worries. You quickly join the formed tubing by soft- or hard-soldering the expanded (if specified) ends. Only two men needed to mount lightweight, rigid coils. No sags, no dips, no denting worries.

In your finished ceiling installation, Bundyweld performs better, too. It transmits heat quickly. It's leakproof (has great bursting strength). It's scale-free, bright and clean, with uniform I.D. and O.D.

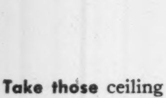
Those proved advantages (and many more) are yours with Bundyweld. It's the *only* tubing double-walled from a single strip, with inside and outside beveled edges. Walls are copper-brazed solid through 360° of contact, copper-coated inside and out.

Check *Sweet's Architectural File* for details. Or write for illustrated brochure. Radiant Heating Division, ***Bundy Tubing Company, Detroit 14, Mich.***

Bundyweld Tubing®

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING



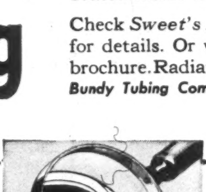
Bundyweld starts as a single strip of copper-coated steel. Then it's . . . continu-

ously rolled twice around laterally into a tube of uniform thickness, and passed

through a furnace. Copper coating fuses with steel. Result . . . Bundyweld

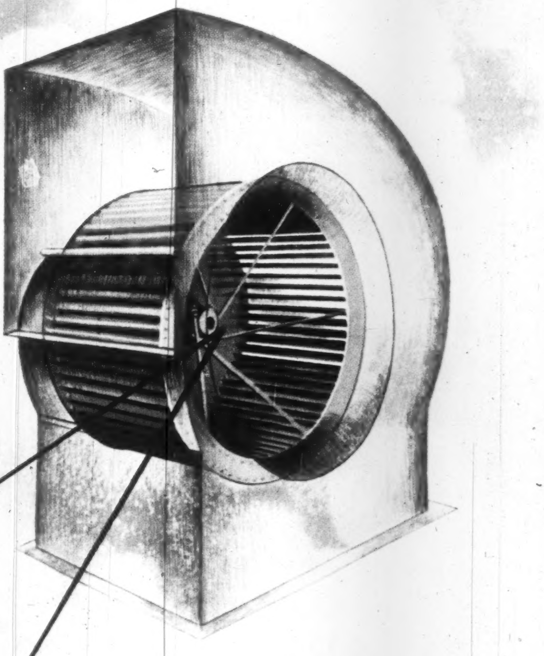
SIZES UP TO ⅝ O.D.

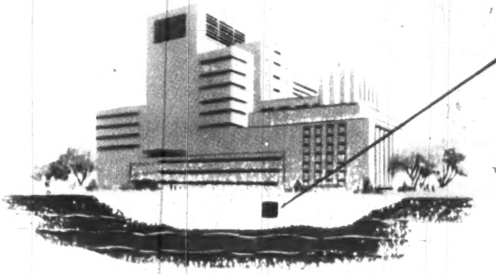
steel tubing, double-walled, and brazed through 360° of wall contact.



NOTE the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

American Blower – a time-honored name in air handling





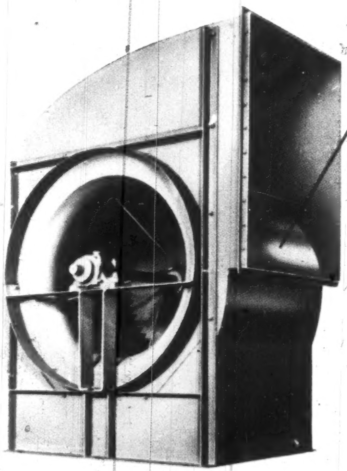
Since 1908, thousands upon thousands of Sirocco Fans have been installed throughout the world—in mechanical draft and industrial applications, in heating, drying, ventilating, air conditioning, fume removal and proc[illegible]ing systems.

This unparalleled record in the field is due in part to these facts: The Sirocco Fan operates at lower speed, delivers more air per revolution than any other type fan, and, for a given duty, the Sirocco Fan occupies the minimum amount of space.

For data on how the Sirocco Fan can best be applied to your business, consult the nearest American Blower Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION



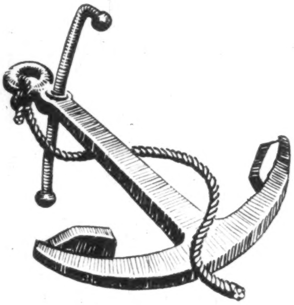
American Blower Series 81 Sirocco Fan. All Sirocco Fan ratings are Certified in accordance with the Standard Test Code as adopted jointly by the NAFM and ASH&VE.

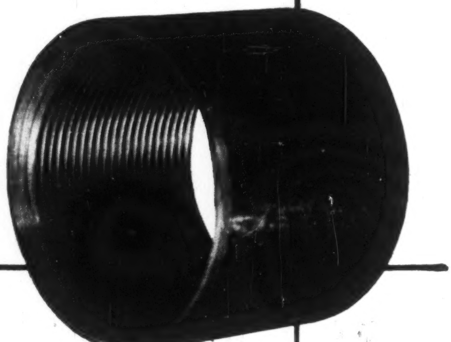
AMERICAN BLOWER
YOUR BEST BUY IN AIR HANDLING EQUIPMENT

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • ACME CABINETS • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

GET THE CONNECTION?





WHEATLAND PRECISION COUPLINGS HOLD TIGHT

Clean outside finish. Continuous even depth thread. Deep round chamfer. Heavy galvanized coating. Pressure tested. Write for complete information.

precision couplings by

WHEATLAND STEEL PRODUCTS COMPANY

BANKERS SECURITIES BLDG., PHILADELPHIA 7, PA.

Scrap is needed in greater quantities than ever before. Do your part—get in the scrap today!

A COMPANION TO . . .
THE "FAN-AIR" AUTOMATIC MECHANICAL DRAFT "PACKAGED" GAS BURNERS
NOW AVAILABLE AS . . .

COMBINATION BURNERS

FULLY AUTOMATIC AND FEATURING

Entrained **OIL or GAS** *Combustion*

Presenting the (MGO-2-C3) fully automatic mechanical draft **combination GAS & OIL BURNER** featuring the METTLER RECTIFIER SPARK IGNITED SAFETY PILOT with dependable Electronic Flame Failure Protective devices for **Both Fuels.**

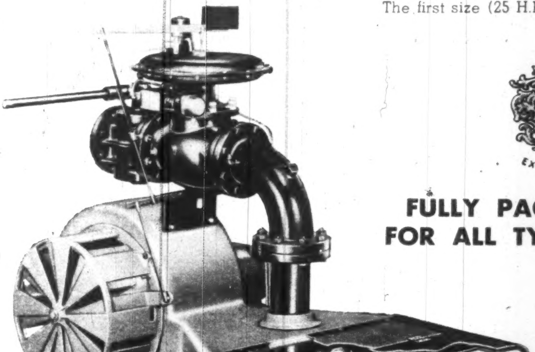
A simple "flip of the switch" or automatic remote control, changes from GAS to OIL or in reverse. Air register synchronized to both fuels: Delayed Oil valve prevents smoky starts: Full Gas & Oil retention: Centrally assembled appurtenances instantly removable: No complex adjustments necessary: GAS or OIL & AIR mixed within burner head: It's an exclusive METTLER design with patents pending: **Nothing else like it on the market.**

The first size (25 H.P.) pictured here with larger sizes in process.

WRITE FOR DETAILS AND PRICES.

EXPERTO CREDE

FULLY PACKAGED ASSEMBLIES FOR ALL TYPES OF GAS OR OIL



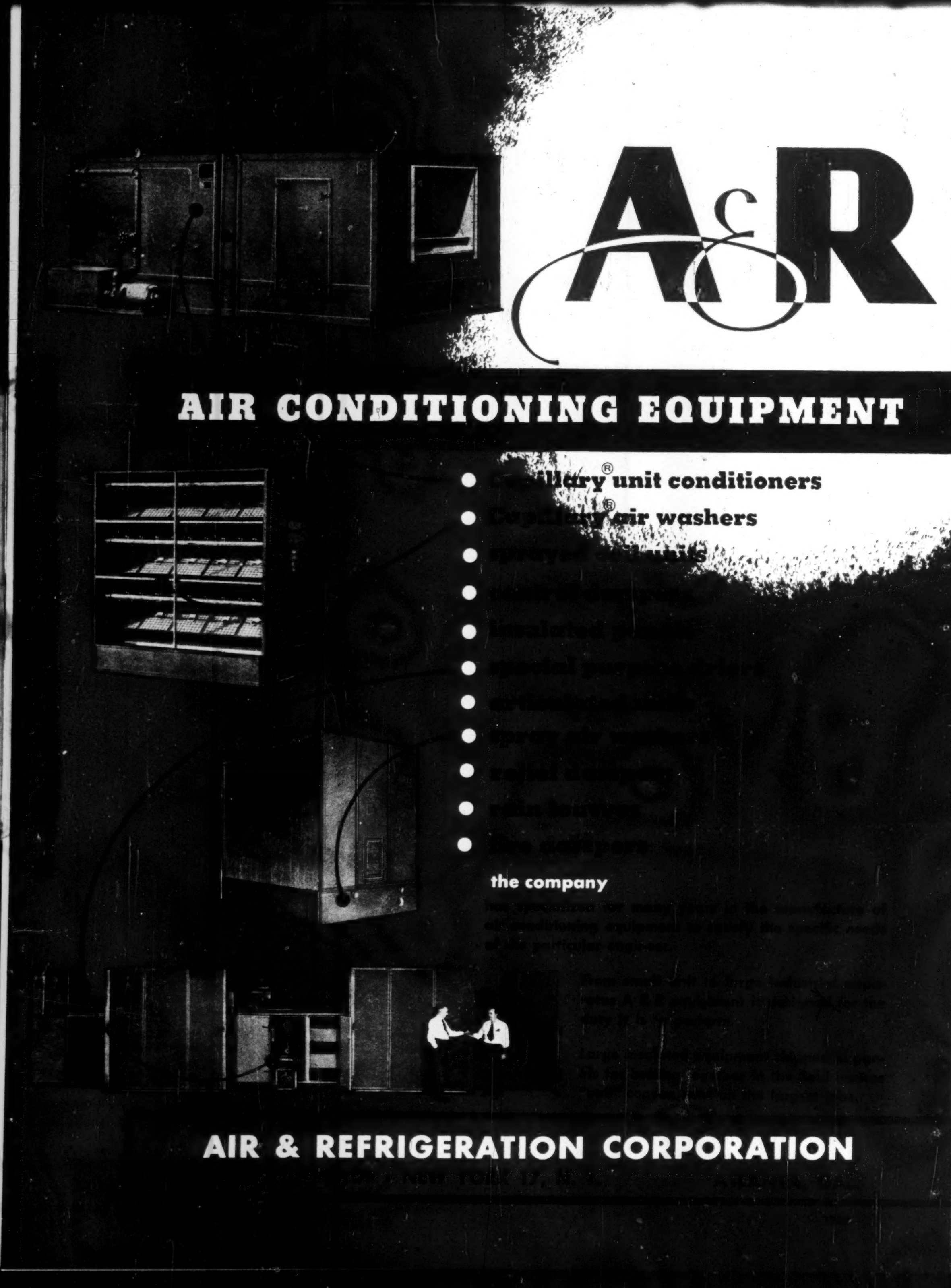
Above section view of No. 42F-3 FAN-AIR GAS BURNER embodying Steam Atomizing Oil Burner as secondary fuel (400 H.P.)

Series "C"
FULL AUTOMATIC
ASSEMBLY
(10 to 300 H.P.)
FOR NATURAL DRAFT OPERATION ONLY

Other Standard Industrial Burners of various types are made in about twenty standard sizes.

THE **METTLER CO,** INC.

4366 WORTH STREET • LOS ANGELES 63, CALIF.



A&R

AIR CONDITIONING EQUIPMENT

- Capillary® unit conditioners
- Capillary® air washers
- sprayed coil units
- control dampers
- insulated [illegible]
- special purpose [illegible]
- [illegible]
- spray air [illegible]
- radial dampers
- rain louvers
- fire dampers

the company

has specialized for many years in the manufacture of air conditioning equipment to satisfy the specific needs of the particular engineer.

From small unit to large industrial applications A & R equipment is designed for the duty it is to perform.

[illegible]

AIR & REFRIGERATION CORPORATION

[illegible] NEW YORK 17, N. Y. [illegible]

Indignant about the steel shortage?

Let us try to help you! In the supplies of steel that are available, we can often find a type of steel that will answer your particular purpose. Call one of our salesmen the next time you are faced with a steel supply problem. Our experience and resources may furnish your solution.

SCRAPPY SAYS:
AID DEFENSE
MORE SCRAP
TODAY...
MORE STEEL
TOMORROW

UNITED STATES STEEL
COMPANY

UNITED STATES STEEL SUPPLY DIVISION

HEADQUARTERS: 208 SO. LA SALLE ST., CHICAGO 4, ILL.

Warehouses and Sales Offices: BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL.
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[redacted]

This question—not as naive as it seems—directs your attention to a very important consideration: the necessity for conserving, as much as you can, whatever material you now have—particularly copper tubing.

As you know, all metals are in short supply. You must endeavor not only to protect your present installations, but also be more critical in the selection of any new supplies you contemplate buying.

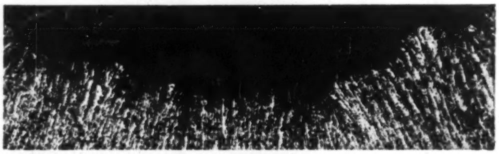
By specifying Wolverine in your purchases of copper and copper base alloy tubing, or for your fabricated tubular parts, you will assure yourself of long, continuous dependable service; and meanwhile also help the national preparedness program. Furthermore, you will relieve yourself of many worries induced by unwarranted breakdowns and replacements.

Examine the three photomicrographs here which show a comparison of the relative construction and surfaces of different tubes. You can readily detect the very smooth surface shown in Specimen C (Wolverine tube) which obviously provides for a smooth flow of liquids and gases.

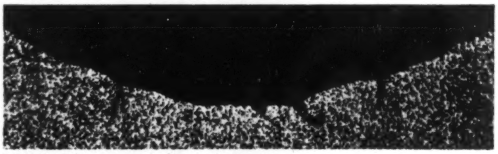
Wherever you need copper tubing, use Wolverine—the tube that is quality-controlled from ore to finished product—to give you the kind of service you expect. **WOLVERINE TUBE DIVISION,** Calumet & Hecla Consolidated Copper Company, Incorporated, *Manufacturers of Seamless Non-ferrous Tubing,* **1419 CENTRAL AVENUE, DETROIT 9, MICHIGAN.**

[redacted]

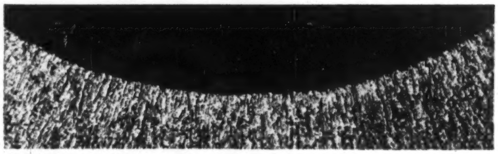
All 200X Magnification



SPECIMEN A—*Note roughness of bore.*



SPECIMEN B—*Overlap defect.*



SPECIMEN C—*Smoothness.*

Plants in Detroit, Mich. and Decatur, Ala.

Wolverine Mill Depots:

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LONG ISLAND CITY, N. Y. • PHILADELPHIA, PA. • PROVIDENCE, R. I. • ST. LOUIS, MO.

Export Department, 13 E. 40th St., New York City 16, N.Y.

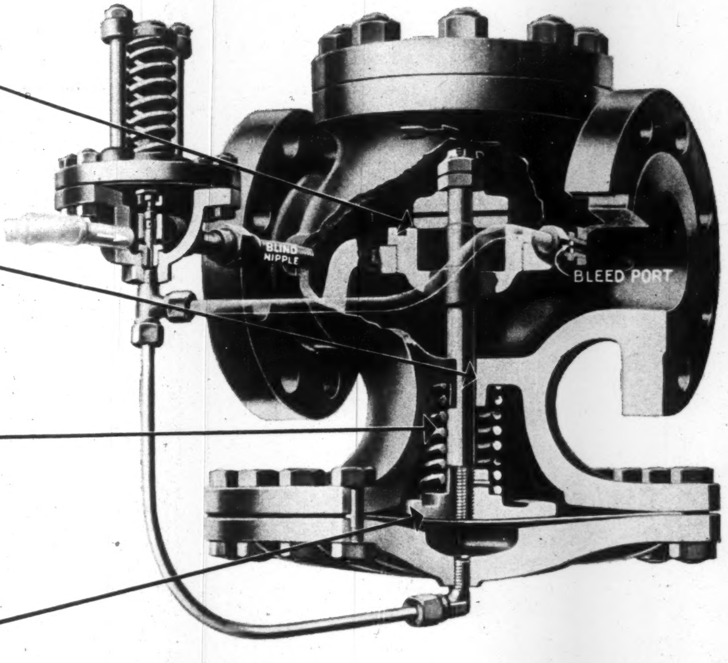
WHY Spence Regulators Outlast The Field

SECO METAL SEATS AND DISCS — Durable SECO Metal resists wiredrawing. More than *twenty years of experience* in thousands of installations has failed to produce a single case where SECO Metal has been cut by steam.

PACKLESS CONSTRUCTION — All Spence main valves and most pilots are built without stuffing boxes. This minimizes friction . . . eliminates much time-consuming maintenance.

SPRING OUT OF PATH OF STEAM — The spring in the Spence Regulator is out of the path of the steam or other fluid flowing through the valve. It operates at low unit stress for exceptionally long life.

LARGE BALANCED DIAPHRAGM—Spence metal diaphragms, under usual conditions, never require replacement. Spence Regulators have few moving parts and those few are ruggedly constructed and seldom require attention.



Spence Type EQ back pressure regulator — operation of main valve is controlled by a sensitive pilot to regulate the initial pressure. Same pilot is used with all sizes of main valves.

The features shown above explain why you profit on every important count with Spence Pressure and Temperature Regulators.

Learn more about these and many other advantages of Spence Regulators by sending for Bulletin 350.

DURABILITY	Spence Regulators perform dependably year after year.
ACCURACY	You can be sure of accurate control for the life of the regulator.
MAINTENANCE	You don't need expensive repairs or special maintenance. That means less down-time, less time and money wasted on replacement of parts.

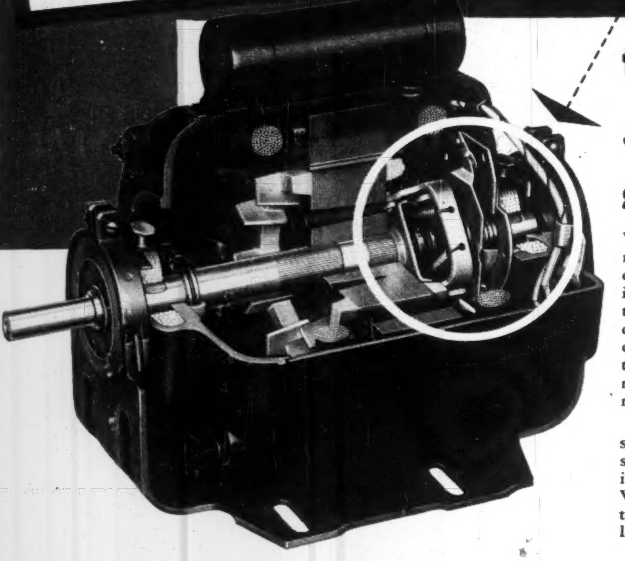
SE-110

SPENCE ENGINEERING COMPANY, INC.
WALDEN, NEW YORK

Spence

Wagner
ELECTRIC MOTORS
. . . the choice of leaders in industry

Here's the switch

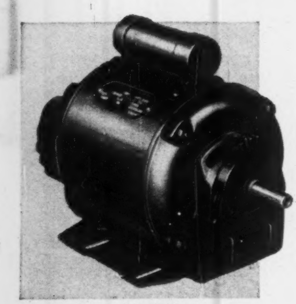


that made 3,000,000 starts and stops

Wagner Type RK capacitor-start induction motors are equipped with a Wagner-made centrifugal switch that disconnects the starting winding and capacitor from the line when the motor approaches operating speed. One of these switches, from a 1/3 hp motor, made over three million starts and stops under test—more than the motor in service would make in 85 years if it started every fifteen minutes, day and night!

In most cases, the useful life of a capacitor-start motor is determined by the life of the switch. The long life of the Wagner switch is only one of many features that make Wagner Type RK Motors the *right* choice to power your product with assurance of long, troublefree operation.

AND HERE'S THE MOTOR that fits your needs for applications requiring high starting torque



Wagner Type RK Motor
1/6 through 3 h.p.

Wagner capacitor-start induction motors are your best choice for applications where starting loads are fairly heavy, but which can be brought up to operating speed quickly. They have become increasingly popular for installation on equipment such as mechanical refrigerators, air conditioning equipment, domestic water pumps, motor-driven tools, coal stokers, and on similar fractional horsepower applications.

These motors offer low maintenance cost—only a minimum of servicing is required—and they give many years of reliable service with unusual freedom from vibration and noise.

* * *

When you standardize on Wagner Motors you get the advantages of a liberal warranty . . . of nationwide service facilities, with replacement motors and parts available from more than 650 Authorized Service Stations plus 25 Wagner-owned Service Branches. You can choose from a wide variety of types and sizes (from 1/125 to 400 hp). Bulletin MU-185 gives complete information—write for your copy.

® Wagner
Electric Corporation
EST. WE 1891

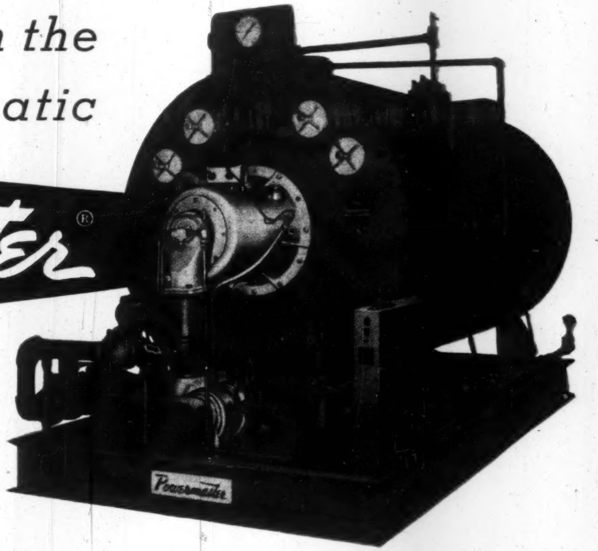
WAGNER ELECTRIC CORPORATION
6370 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

Cable Address: WAGNERELEC, St. Louis

[illegible]

now you can reduce steam costs with the automatic Powermaster®



Model 3 *Powermaster* — 15 to 500 H.P.; high or low pressure models for steam or hot water.

Exclusive burner design (patent applied for) is yours with the *Powermaster* steam generator. Compare this unit with others and you'll see why users are saving hundreds of dollars on fuel bills. Only the *Powermaster* gives you these 3 definite ways to reduce your costs for steam or hot water—

1. *Use less fuel* when boiler operates between 100% and 30% of capacity. Special burner gives you full modulation in a wide range between high and low fire.

2. *Save clean-up time* and money because complete combustion of fuel gives practically smokeless and carbon-free operation. Case histories show that the *Powermaster* needs cleaning less often than other self-contained units.

3. *Change from oil to gas* (or gas to oil) in just a few minutes. Take advantage of low fuel rates, enjoy freedom from worry about fuel shortages.

Write for this catalog

that gives you the entire story of the *Powermaster* steam generator. Just ask for Catalog 1218 and we'll put one in the mail for you.

Powermaster

ORR & SEMBOWER, INC., *Established 1885*
990 Morgantown Road, Reading, Pennsylvania

only the Powermaster® gives you all 3 advantages

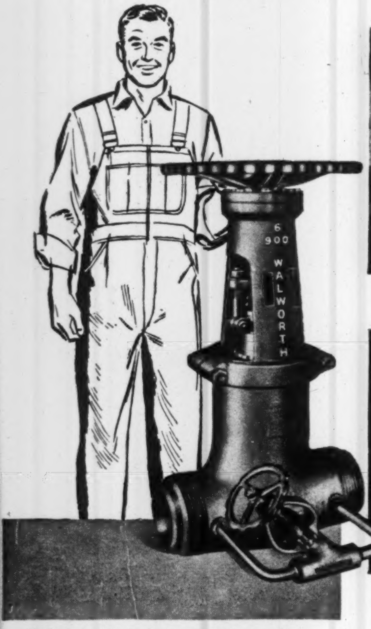
Your Customers and Prospects are reading this message. It tells why the Powermaster gives outstanding performance for

- LOW PRESSURE steam or hot water for heating
- HIGH PRESSURE steam for processing

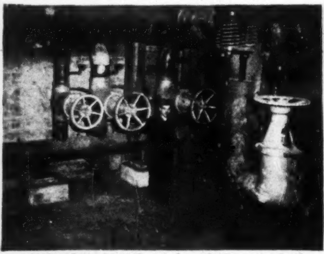
We'll be glad to send you more information.

WALWORTH *Pressure-Seal* VALVES

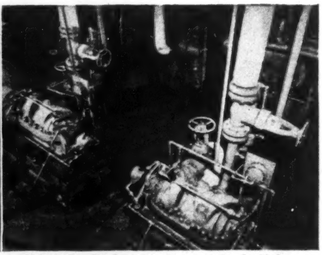
For high-pressure, high-temperature services



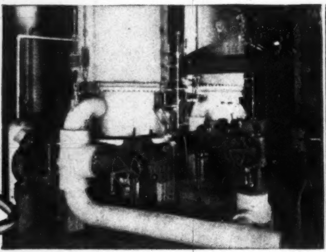
Walworth 6-inch Series 900 Pressure-Seal Gate Valve with Series 1500 Y-type Globe Valve on the by-pass.



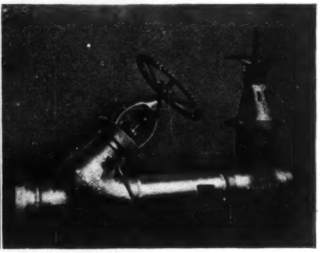
CHEMICAL PLANT: Walworth Pressure-Seal Valves in the pressure reducing station of a chemical plant.



MARINE: Walworth Pressure-Seal Valves aboard the S.S. "Wilfred Sykes"— largest Great Lakes ore carrier.



LIGHT AND POWER: Walworth Pressure-Seal Valves equipped with motor operators, in an eastern public utility plant.



PAPER MILL: Fabricated header with 8-inch Series 600 Pressure-Seal Y-Globe Non-Return Valves and Series 600 Pressure-Seal Gate Valve.

SMALL VALVES FOR HIGH PRESSURE-TEMPERATURE SERVICE

Series 1500 Cast Steel Y-type Globe and Angle Valves in sizes ¼ to 2 inches.

The bonnet and body design of Walworth Pressure-Seal Valves is such that the pressure within the valve is used to prevent leakage at the junction of the bonnet and body. The bonnet joint of the Walworth Pressure-Seal Valve is permanently tight because there is no dependency on the ability of any component part of the joint to resist creep during long exposure to high temperature. Sudden temperature and pressure changes do not affect this tightness. Bonnet flanges and studs are eliminated and the weight of the valve is reduced.

An improved flexible disc design maintains seat tightness, even when the valve body is distorted by pipeline stresses or by temperature and pressure changes. This improved disc design makes it easier to open and close this valve.

Walworth Pressure-Seal Valves are easy to disassemble and assemble, and are the most satisfactory valves for high-pressure, high-temperature service. They are available in Series 600, 900, 1500, 2500 and in a wide range of sizes and types. For further information, write for Circular 116.

WALWORTH

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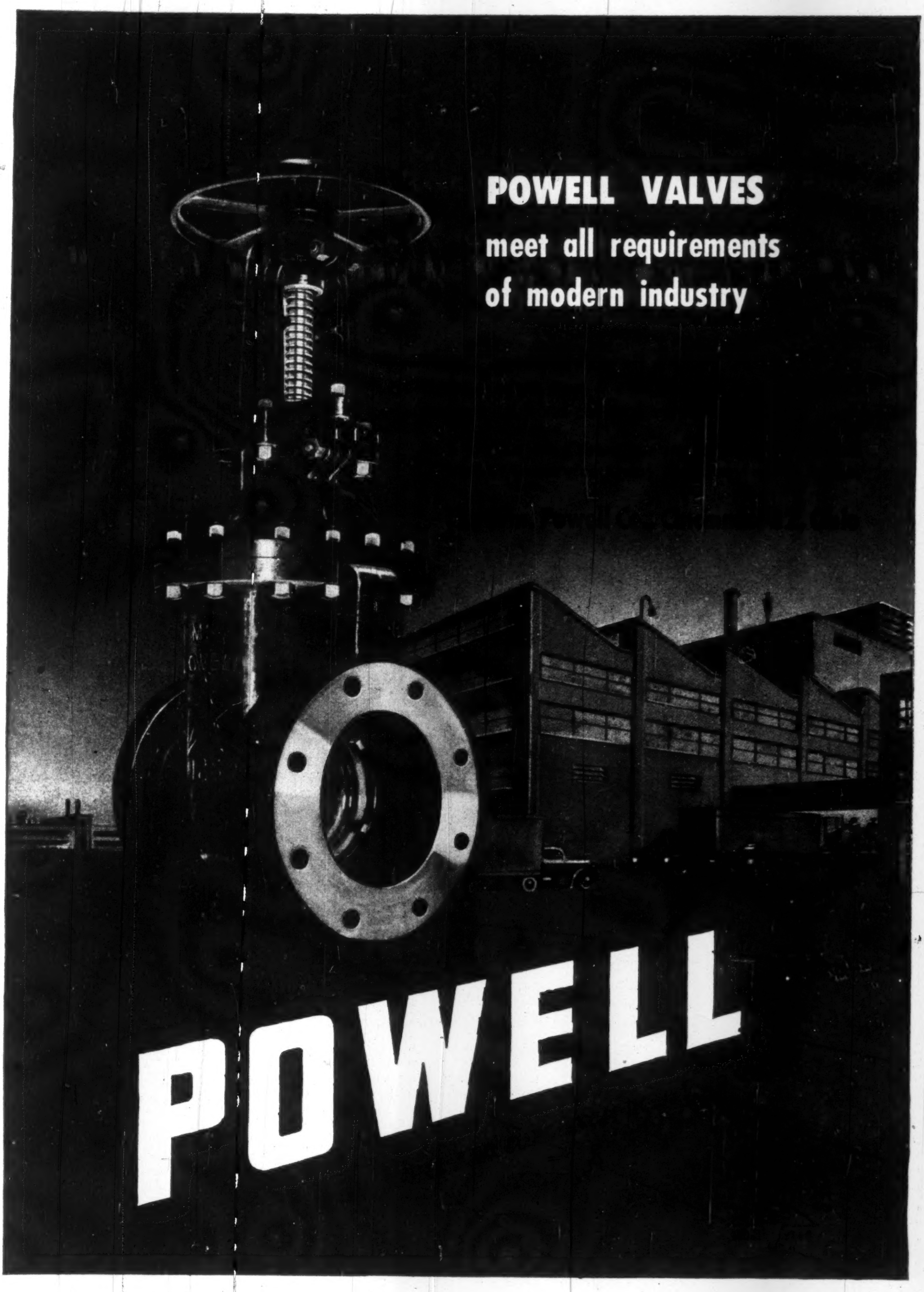
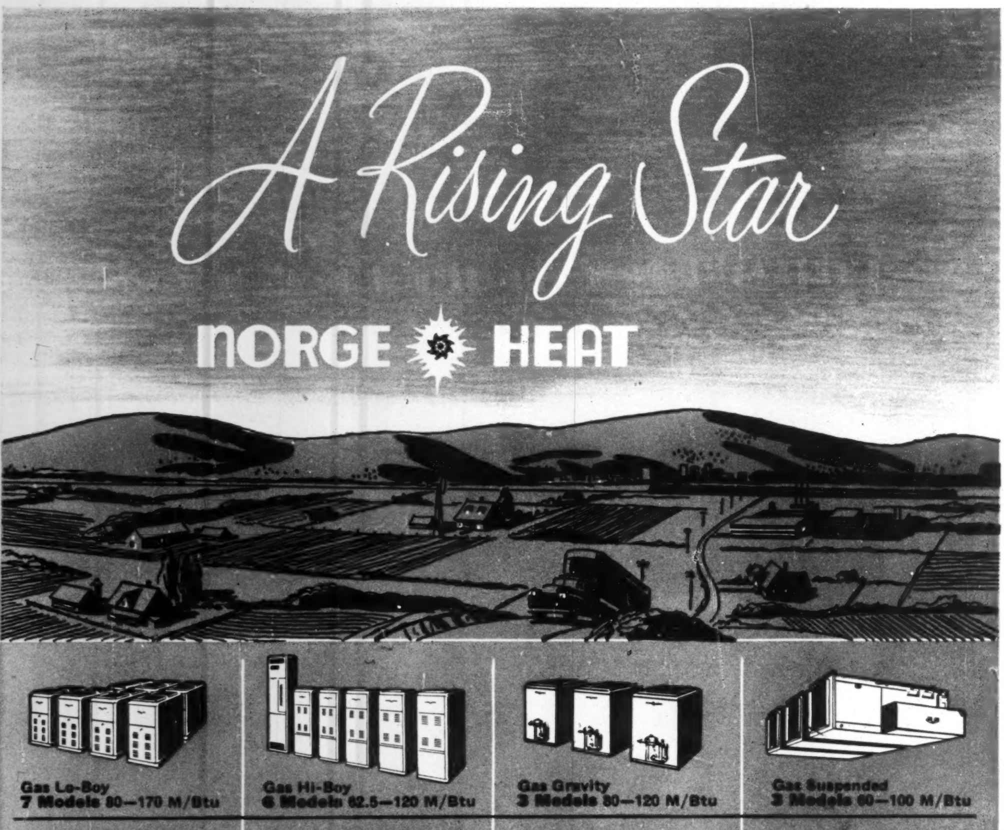
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD


POWELL VALVES
meet all requirements
of modern industry
POWELL



A Rising Star

NORGE HEAT

Gas Lo-Boy
7 Models 80—170 M/Btu

Gas Hi-Boy
6 Models 62.5—120 M/Btu

Gas Gravity
3 Models 80—120 M/Btu

Gas Suspended
3 Models 60—100 M/Btu

Oil Lo-Boy
7 Models 80—180 M/Btu

Oil Hi-Boy
8 Models 60—180 M/Btu

Oil Gravity
4 Models 54—100 M/Btu

Oil Suspended
5 Models 80—180 M/Btu

Coal Gravity and W.A.C.S.
12 Models 20-27" Dia.

Oil and Gas Square Boilers
18 Models to 1440 Sq. Ft.

Oil and Gas Round Boilers
12 Models to 880 Sq. Ft.

Gas and Oil Water Heaters
13 Models 20—66 Gal.

Conversion Gas Burners
7 Models 50—300 M/Btu

Conversion Oil Burners
5 Models .5—6.0 gph.

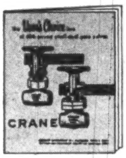
NORGE HEAT
Division of Borg-Warner Corporation
Living's a treat with Norge Heat
CONTROLLED COMBUSTION
BW

why CRANE 600-pound small steel gates are sure to meet your needs

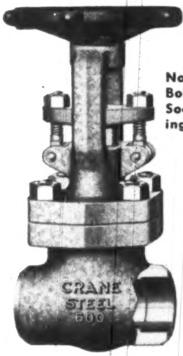
You can't top these Crane Small Steel Gates for dependable performance on high pressure, high temperature lines . . . for ease of operation . . . for simplified maintenance. That's because they include design features normally found only in larger or more expensive valves.

Then too, these Crane valves are available in a choice of types to meet your particular requirements. For example, with union or bolted bonnets; with screwed, flanged, or socket-welding ends; and in trim materials recommended for all common fluids.

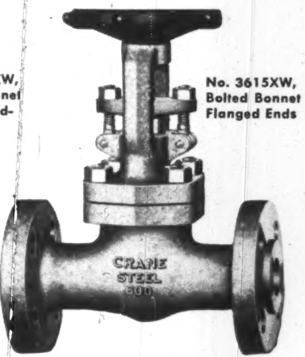
GET NEW DESCRIPTIVE CIRCULAR AD-1881



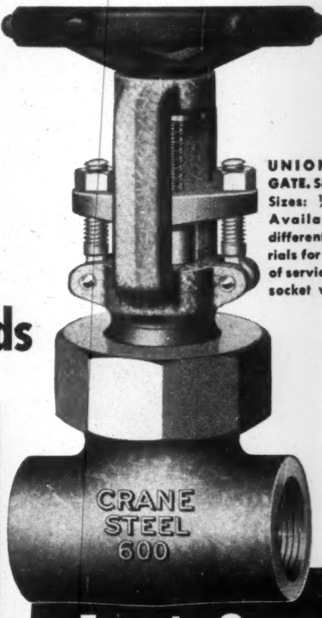
For complete information—including prices—about these longer lasting, easier operating Crane Small Steel Gate Valves. Ask your Crane Representative for your copy, or write direct. No obligation.



No. 3611XW, Bolted Bonnet Socket-Welding Ends

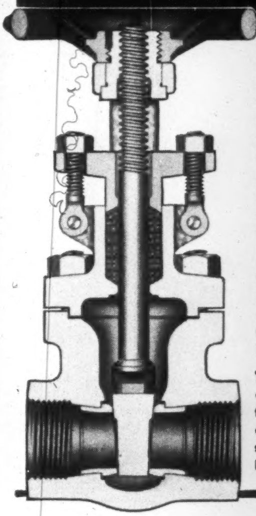


No. 3615XW, Bolted Bonnet Flanged Ends



UNION BONNET GATE. Screwed ends. Sizes: 1/4 to 2-inch. Available in three different trim materials for a wide range of services. Also with socket welding ends

Easy to Operate . . . Easy to Service



EASY ACCESS to stuffing box assured by swinging gland eyebolts. Improved yoke design provides liberal working space.

DEEP STUFFING BOX filled with high quality asbestos packing rings maintains tight stem seal.

LEAKPROOF BONNET JOINT. Soft iron gasket in male and female joint cannot blow out.

T-HEAD DISC-STEM connection provides flexibility for smooth operation; prevents stem distortion or binding of parts.

Cross-section No. 3607XW, Bolted Bonnet Gate, Screwed

CRANE CO.

General Offices:
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Branches and Wholesalers Serving
All Industrial Areas

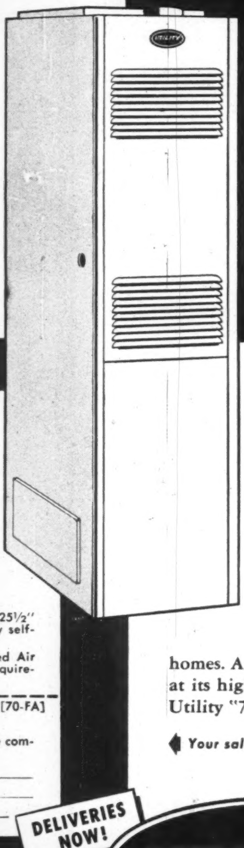
VALVES • FITTINGS • PIPE • PLUMBING • HEATING

NEW UTILITY'S 70FA

Dy-Rekt Drive Blower*

Sy-Lent Heat Exchanger*

**Registered*



Sensational Low Price

Zero Clearance

***UTILITY'S* NEW "70FA" IS EASIEST TO SELL BECAUSE OF THESE FIVE REVOLUTIONARY NEW FEATURES:**

1. New Dy-Rekt Drive Blower* is quietest yet—because of exclusive integrated, direct-drive assembly.

2. Newly-engineered Sy-Lent Heat Exchanger* practically eliminates noise as the furnace heats and cools.

3. Approved for Zero Clearance—can safely be installed flush with combustible material. No outside insulation needed.

4. Easiest to install—can be spotted in only 14"x25½" floor space—in closets, alcoves, etc. Completely self-contained.

5. The Utility Model "70FA" 70,000 BTU Forced Air Furnace is fully approved under latest AGA requirements.

Utility Appliance Corp., Dept. C-152 [70-FA]
4851 South Alameda St., Los Angeles 58, Calif.
Please send me FREE further information on the complete Utility line.

*Name*______________________________
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*City*______________( ) *State*____________

UTILITY now brings you a new high-performance furnace with unbelievable profit opportunities: The Utility "70FA"—a *full* 70,000 BTU forced air furnace at an amazingly low price we believe no other maker can match. The new Utility "70FA" 70,000 BTU Forced Air Furnace provides big-furnace luxury heating at a sensationally low price. It is also ideal for economical zone heating of larger homes. And it practically sells itself at its highly competitive price—so push the new Utility "70FA" and watch the profits roll in!

◀ ***Your sales territory may be open—mail coupon today!***

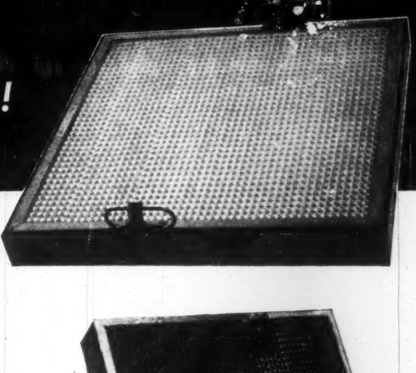
DELIVERIES NOW!

UTILITY
TRADE MARK

Guaranteed Heating Performance

UTILITY APPLIANCE CORP. 4851 South Alameda Street, Los Angeles 58, Calif.
MANUFACTURERS OF AIR COOLERS, GAFFERS & SATTLER AND OCCIDENTAL AUTOMATIC GAS RANGES

UNIQUE FILTER MEDIA in CONTINENTAL *Ezwash* AIR FILTERS proved outstandingly better!



CONTINENTAL

For *efficiency* and *economy* Continental Ezwash Filters are unexcelled. Here are the reasons . . . and the proof provided by impartial scientific tests and supported by performance records in an ever-growing number of installations.

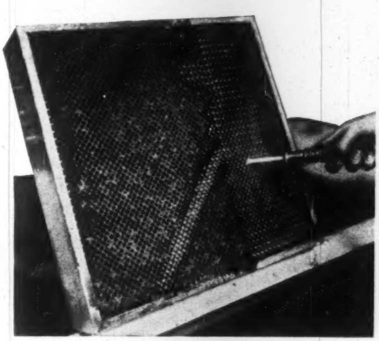
EXTREMELY EFFICIENT—The same unique filter media is used in Continental Ezwash Filters as in the widely acclaimed Continental Automatic Self-Cleaning Air Filters. Air enters through approximately 1600 Honeycomb openings per square foot of filter surface, and then is split into twice as many currents which whirl through a series of turbulent crossings via large, smooth, *non-clogging* air passages. This provides *continuous low resistance*, combined with *exceptionally high cleaning efficiency*.

Continental's resistance to air-flow is a low .08″ of water for the 2″-thick filter, and .12″ of water for the 4″. Target method of testing rates cleaning efficiency of 2″ Continental filter at 97%, and the 4″ even higher. ASHVE Code Method rates Continental Ezwash at an average of 90.8%. Highly efficient by any standards!

OUTSTANDINGLY ECONOMICAL—Continental's high velocity filter media design provides a normal rated capacity as much as 50% higher than conventional units (Continental 20″ x 20″ filter: 1200 CFM). Since less filter area is required in a Continental installation to handle a given volume of air, Continental *saves both space and initial cost*. Continental provides further economy in its low operating and maintenance costs.

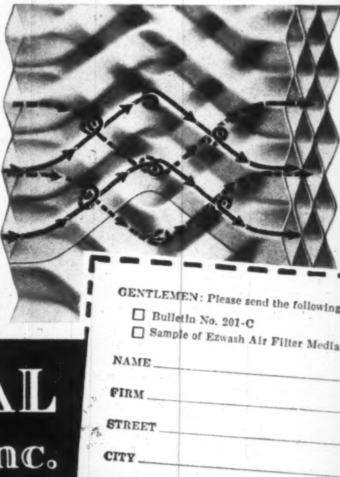
EZWASH FEATURE— Ezwash filters are unusually easy to clean . . . thoroughly! An ordinary hose and cold water readily flush all the collected dust and lint from the large, smooth air-passages. No washing tanks, hot water or detergents.

Write today for more complete information.



TOP: Convenient latch-handles facilitate quick removal of Continental Ezwash unit filters for cleaning.

ABOVE: The Ezwash unit filter can be quickly and thoroughly cleaned with an ordinary hose using cold water.



LEFT: Cross-section diagram of Continental patented filter media showing turbulent air flow, which results in extremely high air-cleaning efficiency and continuous exceptionally low resistance.

For details on Continental Automatic Self-Cleaning Air Filters--

SEE PAGE 217

GENTLEMEN: Please send the following:

☐ Bulletin No. 201-C

☐ Sample of Ezwash Air Filter Media

NAME __________

FIRM __________

STREET __________

CITY __________ STATE __________

CONTINENTAL AIR FILTERS, Inc.

P. O. BOX 1647 • LOUISVILLE 1, KY.

PLAN *with* BALDOR

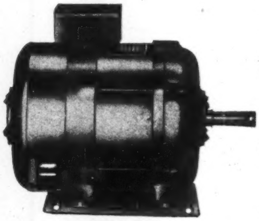
Your Engineering Staff PLUS Baldor Motor Specialists make a good strong team.

In planning new products and redesigning equipment, let the helpful cooperation of the Baldor Engineering Staff serve as a supplementary section of your own Engineering and Production Departments.

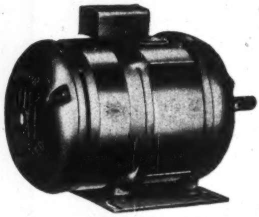
In our quarter-century of diversified motor-applications experience, we have probably solved — for other manufacturers — the very problems that now confront you on your drawing boards.

PLAN WITH BALDOR — the Better Motor for a Better Product.

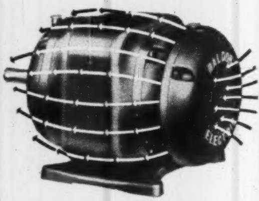
BALDOR ELECTRIC COMPANY, 4353 Duncan Ave., ST. LOUIS 10, MO.
District Offices in Principal Cities



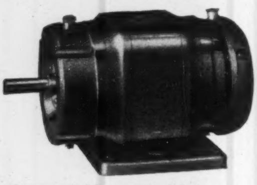
Open, drip-proof construction; 1/6 to 1/3 h.p., 1 phase, 3 phase and direct current.



Streamcooled, round frame, 1/3 to ¾ h.p., 1 phase, 3 phase and direct current.



Streamcooled, polyphase, 1 to 20 h.p. (arrows indicate forced air cooling over entire exterior of motor frame).



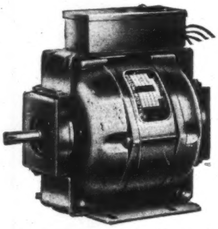
Streamcooled face mounted; 1 phase, 3 phase and direct current.

Baldor builds a complete line of bench and pedestal type Grinders, 6" to 12" wheels, ¼ to 3 h.p., including a special Carbide Tool Grinder.

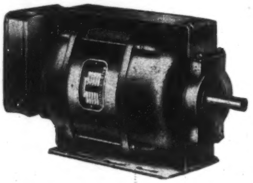
Streamcooled, single phase, ¾ to 7½ h.p.

Streamcooled, direct current, 1 to 5 h.p.

Streamcooled, face-mounted with tripod; for vertical mounting.



Resilient-mounted, open, drip-proof, for belt drive; 1/10 to ¾ h.p., single phase.



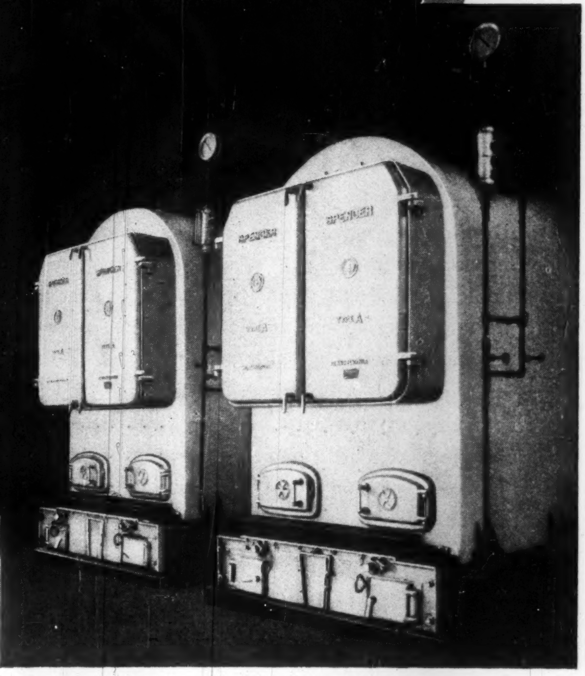
Resilient-mounted fan motor 1/30 to ½ h.p., 1 phase; ⅛ to ½ h.p., 3 phase.

Baldor
BETTER MOTORS
FOR MORE THAN A QUARTER OF A CENTURY

SPENCER

THE QUALITY LINE OF

HEATING BOILERS



Modern Spencer Boilers installed in the big new Walter M. Williams High School, Burlington, N. C.

Heating Contractor: Robb Plumbing & Heating Company, High Point, N. C.

Architect: R. R. Markley, A.I.A., Durham, N. C.

Heating Engineers: Watson & Hart, Greensboro, N. C.

There is a Spencer for every building . . . for every fuel

You can select from 76 different models, both cast-iron and steel. Versatile, dependable, every Spencer Boiler is backed by more than sixty years of leadership . . . precision-engineered and manufactured to give superior, guaranteed service.

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PLAN *with* BALDOR

Your Engineering Staff PLUS Baldor Motor Specialists make a good strong team.

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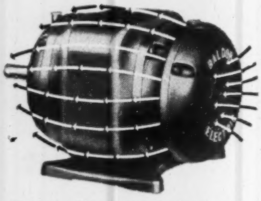
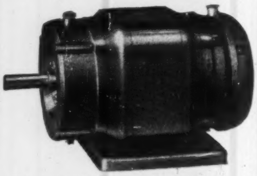
In our quarter-century of diversified motor-applications experience, we have probably solved — for other manufacturers — the very problems that now confront you on your drawing boards.

PLAN WITH BALDOR — the Better Motor for a Better Product.

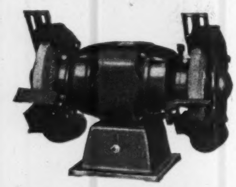
BALDOR ELECTRIC COMPANY, 4353 Duncan Ave., ST. LOUIS 10, MO.
District Offices in Principal Cities



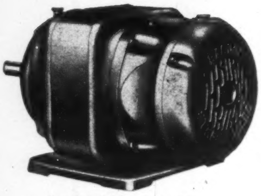
Streamcooled, polyphase, 1 to 20 h.p. (arrows indicate forced air cooling over entire exterior of motor frame).



Streamcooled face mounted; 1 phase, 3 phase and direct current.

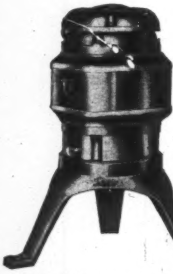


Baldor builds a complete line of bench and pedestal type Grinders, 6" to 12" wheels, ¼ to 3 h.p., including a special Carbide Tool Grinder.

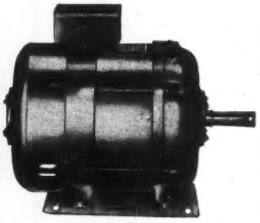


Streamcooled, single phase, ¾ to 7½ h.p.

Streamcooled, direct current, 1 to 5 h.p.

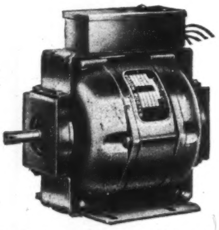


Streamcooled, face-mounted with tripod; for vertical mounting.

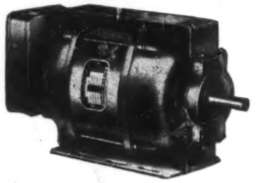


Open, drip-proof construction; 1/6 to 1/3 h.p., 1 phase, 3 phase and direct current.

Streamcooled, round frame, 1/3 to ¾ h.p., 1 phase, 3 phase and direct current.



Resilient-mounted, open, drip-proof, for belt drive; 1/10 to ¾ h.p., single phase.



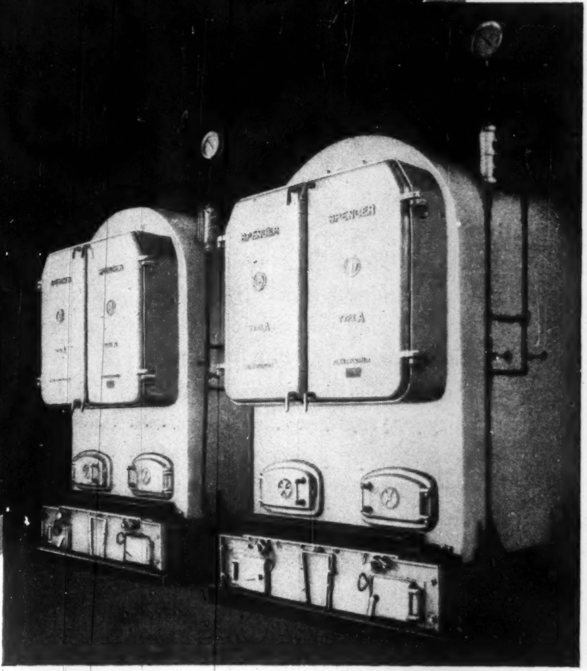
Resilient-mounted fan motor 1/30 to ½ h.p., 1 phase; ⅛ to ½ h.p., 3 phase.

Baldor
BETTER MOTORS
FOR MORE THAN A QUARTER OF A CENTURY

SPENCER

THE QUALITY LINE OF

HEATING BOILERS



Modern Spencer Boilers installed in the big new Walter M. Williams High School, Burlington, N. C.

Heating Contractor: Robb Plumbing & Heating Company, High Point, N. C.

Architect: R. R. Markley, A.I.A., Durham, N. C.

Heating Engineers: Watson & Hart, Greensboro, N. C.

There is a Spencer for every building . . . for every fuel

You can select from 76 different models, both cast-iron and steel. Versatile, dependable, every Spencer Boiler is backed by more than sixty years of leadership . . . precision-engineered and manufactured to give superior, guaranteed service.

Write for Spencer Catalogue today.

I.B.R SBI H

SPENCER
HEATER
LYCOMING-SPENCER DIVISION
WILLIAMSPORT LYCO PENNSYLVANIA

ONLY THE SPORLAN CATCH-ALL FILTER-DRIER

offers you both

GREATEST FILTERING AREA
HIGHEST DEGREE OF ACTIVATION

Size for size, the Sporlan Catch-All with its scientifically molded porous cylinder offers the greatest filtering area because its end surface is augmented by its complete cylindrical surface into a tri-dimensional filtering area, filtering out any foreign matter as minute as 9 microns with negligible pressure drop!

Sporlan Catch-Alls are activated to the highest degree of dryness after they are completely assembled by subjecting them to a temperature of over 500° F. for a minimum of four hours! The Sporlan Catch-Alls are then sealed with moisture proof seals to prevent any loss of activation before installation.

Catch All
TRI-DIMENSIONAL FILTERING AREA

When you want perfectly clean, perfectly dry refrigeration systems . . . install

SPORLAN ***Catch-Alls***

the perfect filter-driers and GET PEAK PERFORMANCE ON ALL INSTALLATIONS

Catch-Alls are available in all sizes at all Sporlan wholesalers

AND HERE ARE 5 ADDITIONAL EXCLUSIVE CATCH-ALL FEATURES

1. They cannot powder!
2. They cannot pack!
3. The refrigerant cannot channel around the desiccant!
4. The unique, porous Catch-All cylinders are molded of minute particles of a highly efficient desiccant, the efficiency of which is greater than that of the same desiccant in granular form.
5. They dry down to a low end point . . . a point so low that any remaining moisture is absolutely harmless!

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VALVE COMPANY

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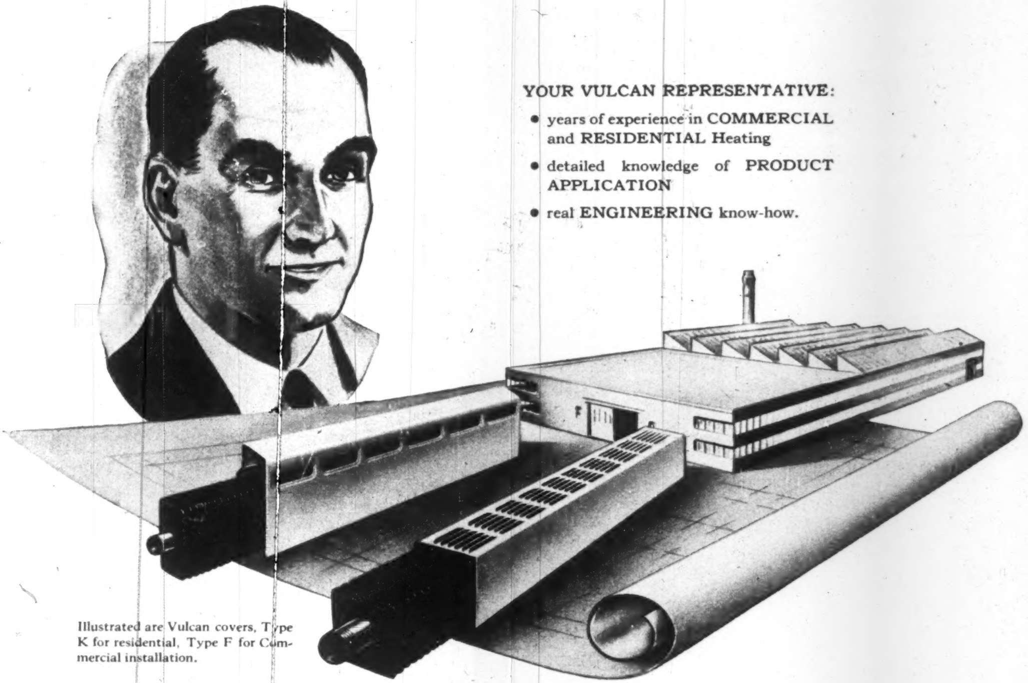
YOUR VULCAN REPRESENTATIVE:

- years of experience in COMMERCIAL and RESIDENTIAL Heating
- detailed knowledge of PRODUCT APPLICATION
- real ENGINEERING know-how.



Illustrated are Vulcan covers, Type K for residential, Type F for Commercial installation.

Blueprint for Vulcan Service

Vulcan Service is more than just expediting. Actually, Vulcan Service begins with a background of over 25 years of experience. It includes the selection of QUALITY MATERIALS; SKILLED WORKMANSHIP; EFFICIENT MANUFACTURING PROCEDURES; a PROVEN PRODUCT with patented features that make Vulcan unique in the field of fin-tube radiation; ENGINEERING RESEARCH facilities available to customers and prospects alike — *plus* a hand-picked group of specialists with the qualifications listed above, representing Vulcan from coast to coast. These Vulcan representatives have the "blue print" for Vulcan heating comfort and economy. Call on them for further information.

Vulcan means economy from start to finish.

The VULCAN Radiator Co. 16 Francis Ave., Hartford 2, Connecticut

Made in Canada under trade name of Heal Radiation by the Vapor Car Heating Company of Montreal.

VULCAN REPRESENTATIVES IN PRINCIPAL CITIES

Albany, N. Y.
G. W. Heacock & Co., Inc.

Albuquerque, N. M.
Boyd Engineering Co.

Atlanta, Georgia
John A. Dodd Co.

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Virgil A. Smith

Boston, Mass.
C. R. Swaney Co.

Bridgeport, Conn.
E. R. Clement, Inc.

Buffalo, N. Y.
Frank J. Weber & Assocs.

Charlotte, N. C.
Kirk Cousart & Assocs.

Chicago, Ill.
Roy O. Nelson Co.

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Cleveland, Ohio
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J. R. Dowdell & Co.

Dallas, Texas
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Denver, Colo.
Appleton Engineering Co.

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James A. Hughes

El Paso, Texas
Boyd Engineering Co.

Houston, Texas
J. R. Dowdell & Co.

Indianapolis, Ind.
Jackson Engineering Co.

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John C. Pastor

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H. H. Wright Co.

Knoxville, Tenn.
Charles F. Sexton

Los Angeles, Calif.
Norman S. Wright & Co.

Memphis, Tenn.
W. K. Hornbuckle

Milwaukee, Wis.
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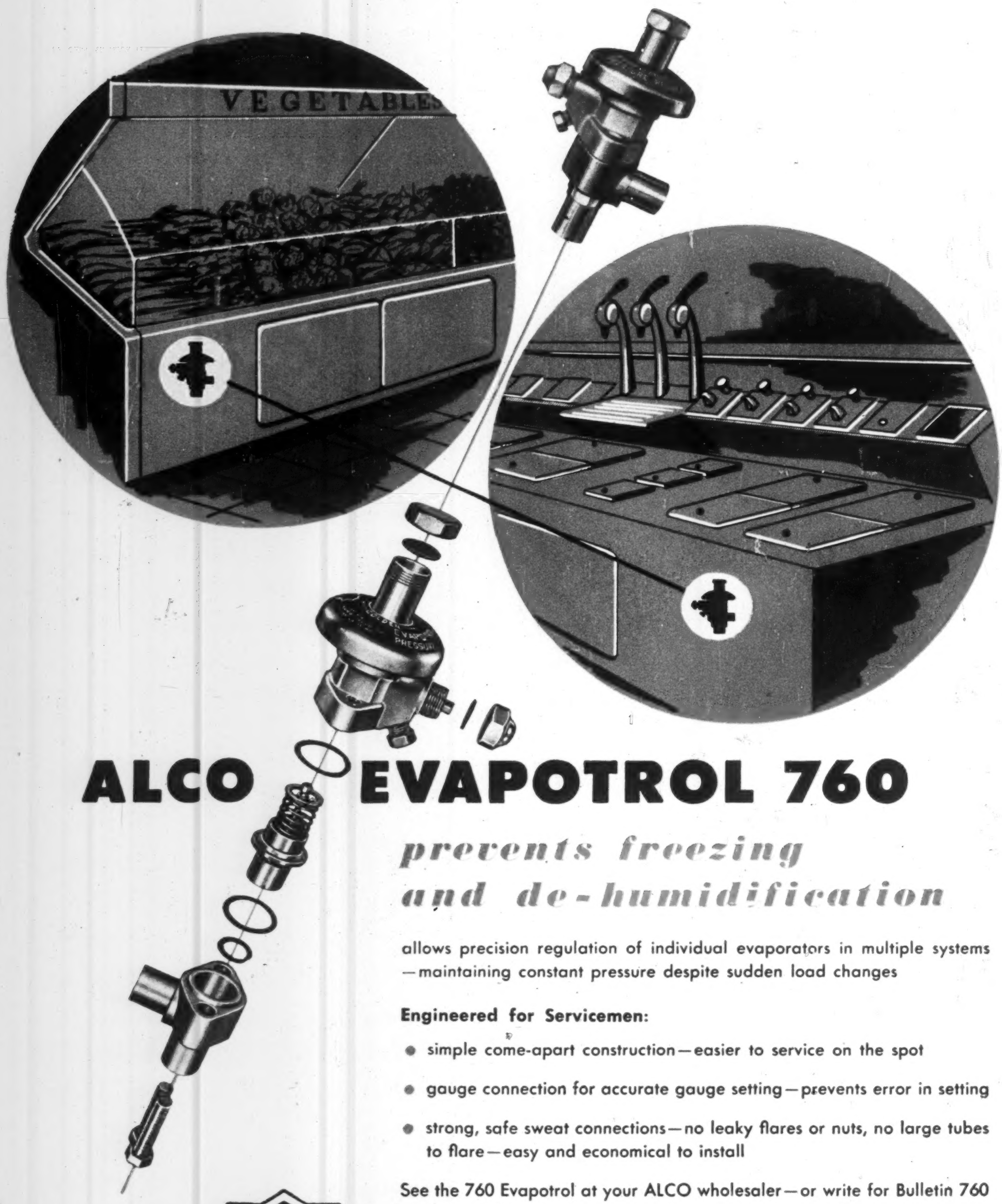

ALCO EVAPOTROL 760

prevents freezing and de-humidification

allows precision regulation of individual evaporators in multiple systems—maintaining constant pressure despite sudden load changes

Engineered for Servicemen:

- simple come-apart construction—easier to service on the spot
- gauge connection for accurate gauge setting—prevents error in setting
- strong, safe sweat connections—no leaky flares or nuts, no large tubes to flare—easy and economical to install

See the 760 Evapotrol at your ALCO wholesaler—or write for Bulletin 760 giving complete details.

ALCO

ALCO VALVE CO.

861 KINGSLAND AVE. • ST. LOUIS 5, MO.

Designers and Manufacturers
of Thermostatic Expansion
Valves, Evaporator Pressure
Regulators; Solenoid Valves,
Float Valves; Float Switches 4864

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TUBE-TURN

Remember the trademarks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Scrappy says, "Aid defense — more scrap today . . . more steel tomorrow."

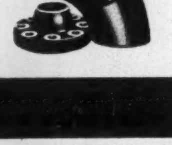
Engineered to reduce pressure loss

- Looks simple, doesn't it . . . that welding fitting? Not so! It's *engineered* . . . for shape, for size, for dimensions, for wall thickness . . . all so that it will do its share of the piping job for you . . . without trouble and at top efficiency. True circularity, smooth inner walls, and full radius combine to reduce pressure loss of any flow of fluid. Micrometer-checked uniform wall thickness and forged-in strength combine to assure long-life, dependable service.

All TUBE-TURN Welding Fittings and Flanges are design *engineered* and held to extremely close manufacturing tolerances giving the utmost in strength, safety and efficiency. You'll find a TUBE TURNS' Distributor in every principal city. Call him for good service in good connections.

Write Dept. A-1 for free booklet on Allowable Working Pressures. Use coupon on reverse side.

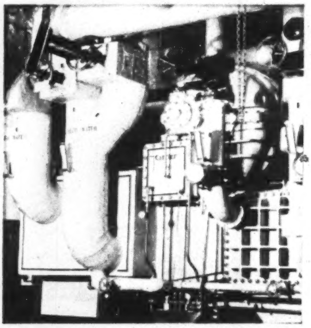
Be sure you see the double "tt"



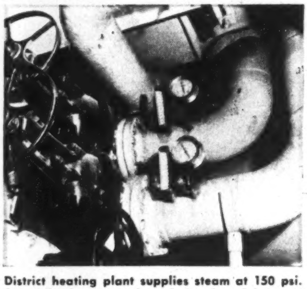
TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Houston • Tulsa • San Francisco • Los Angeles
TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO . . . A wholly owned subsidiary of TUBE TURNS, INC.

Welded piping reduces maintenance for City within a City



Piping for refrigeration machines, ranging up to 14 inches, is trouble-free. Use of TUBE-TURN Welding Fittings also speeded up erection of piping, since most assemblies were shop-welded, then tied into the systems they serve. Insulation was applied easily and is permanent.



District heating plant supplies steam at 150 psi. Steam is then sent through headers fabricated with TUBE-TURN Welding Fittings ranging up to 12 inches, and distributed via steam stations. Optimum flow conditions have been obtained and maintenance overhead minimized.

- Service requirements for the Rockefeller Center group of 15 skyscrapers add up to big figures.

The Center consumes nearly half a billion pounds of steam each year.

The famous outdoor skating rink is kept in use even when temperatures are in the high sixties.

A total of 8,000 tons of refrigeration is available for air conditioning.

But maintenance on all the miles of piping is kept to a minimum. All critical piping systems are welded, and directional changes made with TUBE-TURN Welding Fittings. Thus piping is permanent and leakproof, and vital services are maintained without interruption.

Want Pressure Data?

Tube Turns, Inc. has prepared a booklet of pressure tables covering TUBE-TURN Welding Fittings in all sizes, weights, and regularly manufactured materials for Power, Oil, Heating, Gas, and Refrigeration Piping. [illegible]

working pressures

TUBE TURNS, INC., Dept. A-1
224 East Broadway, Louisville 1, Kentucky

Your Name ....
Position ....
Company ....
Nature of Business ....
Address ....
City .... *State* ....

"tt" and "TUBE-TURN" Reg. U. S. Pat. Off.

DISTRICT OFFICES

New York	Houston
Philadelphia	Tulsa
Pittsburgh	San Francisco
Chicago	Los Angeles

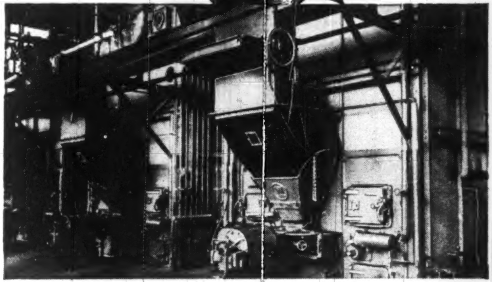
TUBE TURNS, INC.
LOUISVILLE 1, KENTUCKY

"Orchids to Oppenheimer!

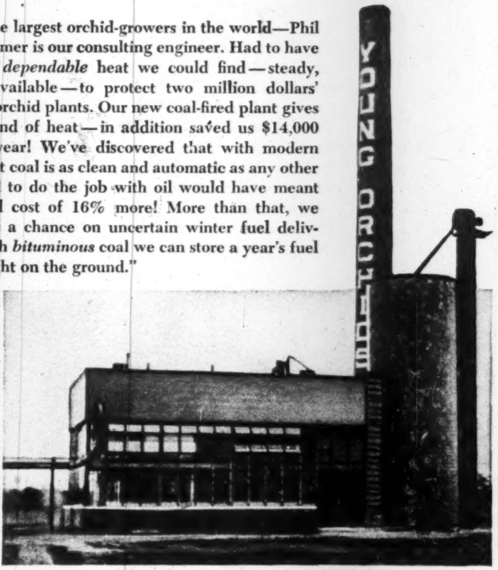
THAT NEW COAL HEATING SYSTEM HE DESIGNED SAVED $14,000 THE FIRST YEAR!"

says Carl R. Beckert, President, Thomas Young Orchids, Inc., Bound Brook, N. J.

"We're the largest orchid-growers in the world—Phil Oppenheimer is our consulting engineer. Had to have the most *dependable* heat we could find—steady, quickly available—to protect two million dollars' worth of orchid plants. Our new coal-fired plant gives us that kind of heat—in addition saved us $14,000 the first year! We've discovered that with modern equipment coal is as clean and automatic as any other fuel—and to do the job with oil would have meant an overall cost of 16% more! More than that, we can't take a chance on uncertain winter fuel deliveries. With *bituminous* coal we can store a year's fuel supply right on the ground."



The firing aisle at the new plant. This highly efficient coal equipment cut the company's fuel costs by 23%—is so completely automatic that it saved $6,000 the first year on labor costs, too!



This 300-ton silo that Young installed does away with former handling and shovelling costs. Coal is fed from the silo by a screw conveyor to each boiler's stoker-hopper—the coal is weighed on its trip.

- Use coal now? Get ALL coal's economy with highly efficient modern equipment. Building a new power plant? Find out how much more economical, efficient a job *bituminous* coal can do. Call in a competent consulting engineer. He can show you the modern coal-handling and combustion installations that will save most while meeting your particular needs. Remember you can count on *bituminous* coal! Of America's total fuel reserve—92% is coal! Even today oil is *imported*—while America can and does *export* coal! Ample coal reserves plus the outstanding efficiency of America's mining companies give coal users *the greatest possible assurance of a dependable fuel supply at stable prices.*

If you're running your own steam plant, here are just a few down-to-earth facts you can't afford to ignore!

COAL in most places is today's most economical fuel.
COAL resources in America are adequate for all needs—*for hundreds of years to come.*
COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.
COAL prices will therefore remain the most stable of all fuels.
COAL is the safest fuel to store and use.
COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association
WASHINGTON, D. C.

FOR HIGH EFFICIENCY *FOR LOW COST*

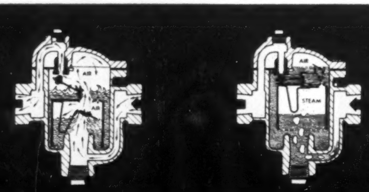
YOU CAN COUNT ON COAL!

NO OTHER STEAM TRAP

gives you all these features for Low Pressure Heating Service!

1. QUICK HEATING

[illegible]



2. EASY INSTALLATION

3. INTEGRAL STRAINER

4. STAINLESS MECHANISM

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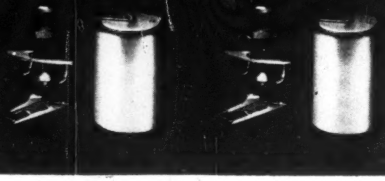


Dependable . . . Guaranteed Performance . . .

Self-scrubbing . . . Non Air Binding . . . Immune to Corrosion.

Traps and Parts in Stock in Over 100 Cities. Call your nearby Armstrong Representative or Jobber Today.

ARMSTRONG MACHINE WORKS
874 Maple Street, Three Rivers, Michigan

THE ARMSTRONG STEAM TRAP BOOK

Send for Catalog

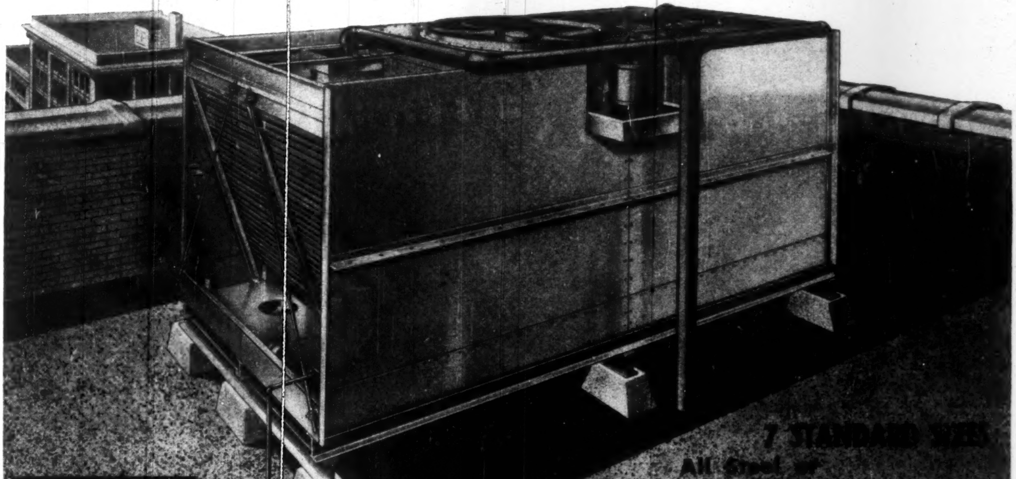
—the new Armstrong Steam Trap Book gives complete data and prices, tells what size trap to use.

ARMSTRONG INVERTED BUCKET STEAM TRAP

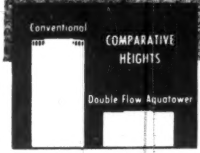
ARMSTRONG STEAM TRAPS

NEW DOUBLE-FLOW AQUATOWER

Marley Introduces Lowest Silhouette, Lowest Pumping Head Cooling Towers For Intermediate Capacities



7 STANDARD SIZES
All Steel or
[illegible] with Asbestos Cement Board Casing



New Simplicity • New Accessibility • New Efficiency

By combining the outstanding features of the large patented Double-Flow and the smaller Aquatower (both accepted leaders in their fields), Marley has produced the cooling tower that will set the standard in another size range . . . THE DOUBLE-FLOW AQUATOWER. Architects, engineers and contractors will be equally enthusiastic about this tower because it is highly efficient, lowest in height and harmonious with building design, and remarkably easy to erect.

The Double-Flow design means low tower height and low pumping head; efficient air utilization—one fan drawing air from two completely open sides—with consequent minimum fan horsepower requirement. Open distribution, "at-a-glance" inspection are features, as are minimum load concentration and economical grillage and support.

From the Aquatower comes simplicity . . . of construction, of piping, of operation. The nailless Redwood filling that is very easily installed or removed is another adaptation. All basin fixtures are readily at hand. Double-Flow Aquatower mechanical equipment is all designed, manufactured and guaranteed by Marley specifically for cooling tower usage . . . and it is all completely accessible.

You'll want complete details of this tower that will fit many installations in many industries, typical of which are those requiring 50 tons or more of refrigeration. Fill out the coupon below and you will receive it immediately.

Producers of
- DOUBLE-FLOW TOWERS
- AQUATOWERS
- VAIRFLO TOWERS
- CONVENTIONAL TOWERS
- DRICOOLERS
- NATURAL DRAFT TOWERS
- SPRAY NOZZLES

MARLEY

The Marley Company, Inc.
222 West Gregory, Kansas City 5, Mo.

Send me your 8-page brochure on the new Marley DOUBLE-FLOW AQUATOWER.

Name ____________________

Firm ____________________

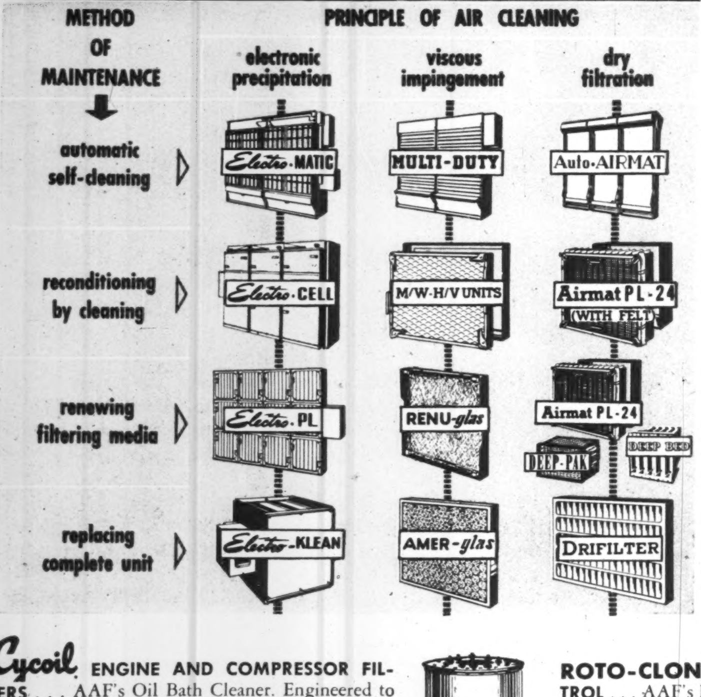
Address ____________________

City ____________ State ____________

AAF AIR

World's Greatest and Only Complete Line of Air Filtration and Dust Control Equipment

The AAF Line of *Engineered* Air Filters

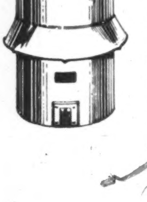


METHOD OF MAINTENANCE	PRINCIPLE OF AIR CLEANING: electronic precipitation	viscous impingement	dry filtration
automatic self-cleaning	*Electro*-MATIC	MULTI-DUTY	Auto-AIRMAT
reconditioning by cleaning	*Electro*-CELL	M/W-H/V UNITS	Airmat PL-24 (WITH FELT)
renewing filtering media	*Electro*-PL	RENU-*glas*	Airmat PL-24 DEEP-PAK DEEP BED
replacing complete unit	*Electro*-KLEAN	AMER-*glas*	DRIFILTER

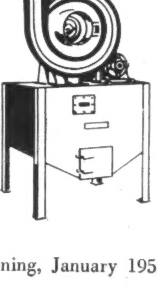
Greater emphasis on selecting the right air cleaner for a specific job has given new importance to American Air Filter's complete line. You see left, for example, twelve distinct types of AAF filters and electronic precipitators charted according to air cleaning principle and method of maintenance. These AAF products offer a wide selection of performance and operating characteristics to meet practically every air cleaning need.

Because of this complete line AAF engineers are not biased by a single type or design and can therefore recommend the filter best suited to the job.

Cycoil ENGINE AND COMPRESSOR FILTERS . . . AAF's Oil Bath Cleaner. Engineered to deliver practically 100% cleaning efficiency, this heavy-duty cleaner protects engines and compressors under conditions of severe dust and dirt. Over 90% of fine dust content in air is trapped in oil, then removed by centrifugal action, before reaching the filter. Added filtering action from filter pads, plus positive oil circulation which produces a self-cleaning action and great dust-holding capacity offers maximum air cleaning results.



ROTO-CLONE DUST CONTROL . . . AAF's line of dynamic and hydrostatic precipitators perform the functions of exhausting, separating and storing the dust in a single compact unit. Available in three distinct types and a complete range of sizes. Preferred throughout industry for simplicity, low operation cost, extreme compactness and maximum efficiency.



headquarters

herman nelson

Unsurpassed Quality for Modern Heating and Ventilating Products

Superiority of engineered features has established records for trouble-free service and low operating cost of Herman Nelson products. The way to be certain of getting the latest refinements in heating and ventilating is to specify and buy Herman Nelson . . . *the constantly-improved line.*

DRAFT | STOP UNIT VENTILATOR

Here is a true innovation for school classrooms. It is the ONLY system of ventilation that traps drafts at the source, makes use of such air motion in controlling introduction of fresh air into rooms, automatically maintaining a healthful, comfortable temperature.

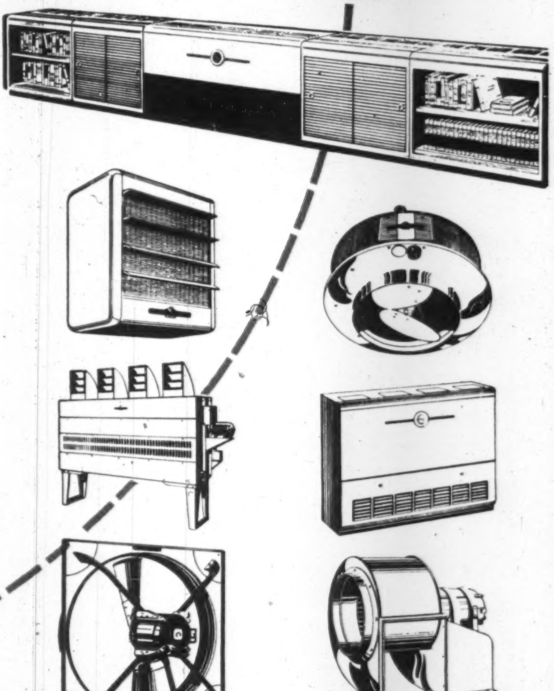
UNIT HEATERS

A complete line of unit heaters including horizontal and vertical propeller-fan type, de luxe, and centrifugal fan-type units. A model and size for every steam or hot water application—request detailed performance data.

PROPELLER FANS—UNIT BLOWERS

Long service of Herman Nelson propeller fans can be attributed to the quality of material and simplicity of design. Fan blades with "air foil" profile produce maximum air delivery . . . efficiently and quietly.

Whatever your requirements for large volume air delivery, there's a size and type of Herman Nelson Unit Blower to serve you. A national field organization assures rapid service. Request complete range of sizes.



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TODAY'S BEST BUY
IS BETTER AIR

American Air Filter
COMPANY INC.,
HERMAN NELSON DIVISION
PLANTS: LOUISVILLE, KENTUCKY MOLINE, ILLINOIS

L. J. Wing

UNIT HEATERS · FANS ·

Offices and Factory: LINDEN

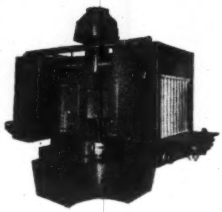
WING Revolving HEATER

REVOLVING UNIT HEATERS

One in a series of revolving unit heaters designed for buildings of average and lower-than-average roof heights. Four adjustable outlets give thorough heat distribution. All Wing Unit Heaters are installed as close as possible to roof or ceiling to prevent accumulation of high-temperature air at that point. Bulletin HR-5.

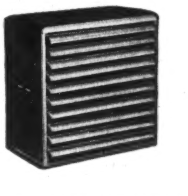
REVOLVING UNIT HEATERS

The entire lower part (the discharge outlets) revolves slowly to distribute the comfortably warmed air over entire area. Machinery, merchandise, etc. cannot obstruct constantly moving air stream as they may with single-direction air stream from fixed discharge heaters. Design illustrated is for very high ceilings as in foundries, mills, factories. Consult Bulletin HR-5.



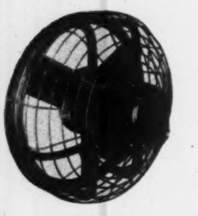
GAS-FIRED UNIT HEATER

The only vertical-discharge gas-fired unit heater. Operates without steam or water. Suitable for operation on either manufactured gas, natural gas, or mixed gases. Furnished with fixed discharge outlets or revolving discharge outlets. May be used also for summer ventilation. Bulletin GH-1.



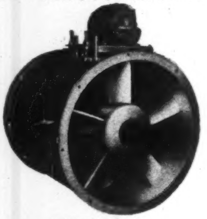
UTILITY UNIT HEATERS

This is one of the types of lightweight suspended unit heaters originated by Wing in 1921. It is used where wide distribution of heat is not essential. Discharge is horizontal with individually adjustable deflector vanes. Supplied with either constant or variable speed motors, the latter for installation in offices, churches, stores or other places where extremely quiet operation is essential. Bulletin U-7.



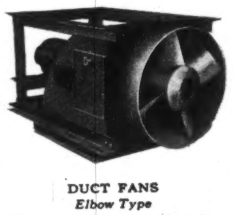
SAFETY VENTILATING FANS

Distinguished for efficiency and rugged construction. The new Wingfoil fan wheel moves maximum volumes of air with minimum horsepower, due largely to its non-overloading feature. Sizes from 10" to 60" dia., with free air capacities from 860 to 58,000 CFM. Larger sizes on special order. Either direct or belt drive. Heavy steel guards provide safety. Consult Bulletin F-10.



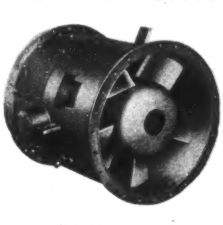
DUCT FANS
Straight Line Type

Designed to form a part of any straight run of duct. The motor is mounted on an adjustable base outside of the housing. V-belt drive is through an air tube carried across the housing and supporting fan shaft and bearings. Fan wheel is the new, non-overloading Wingfoil Fan. Bearings are grease-sealed, requiring minimum of attention. Write for Bulletin F-10.



DUCT FANS
Elbow Type

Designed to form an elbow in the duct system, the elbow-shaped housing in a strong rectangular frame permits installation with the inlet in any desired position. Motor and drive are outside the air stream, therefore remain cool, clean, and easily accessible. The new Wingfoil Fan has a remarkable "non-overloading" characteristic. Sizes 10" to 60"; capacities up to 60,000 CFM. Consult Bulletin F-10.



DUCT FANS VANEAXIAL TYPE

Consists of a Wingfoil Axial Flow Fan mounted in a heavy cylindrical casing and connected directly to a motor suspended within the casing. It is available with or without air straightening vanes. Fan is mounted directly on motor shaft and motor is totally enclosed and dust proof. Entire assembly is sturdily supported by steel spider within the casing. Bulletin F-10.

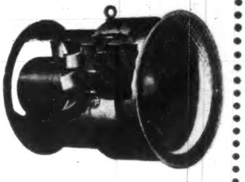
SALES OFFICES IN: ALABAMA, Birmingham • CALIFORNIA, Los Angeles, San Francisco • COLORADO, Denver • CONNECTICUT, New Haven • D. C., Washington • FLORIDA, Tampa • GEORGIA, Atlanta • ILLINOIS, Chicago • INDIANA, Indianapolis • LOUISIANA, New Orleans • MARYLAND, Baltimore • MASSACHUSETTS, Boston • MICHIGAN, Detroit, Grand Rapids, Kalamazoo • MINNESOTA, St. Paul • MISSOURI, Kansas City, St. Louis • NEBRASKA, Omaha •

NG

Mfg. Co.

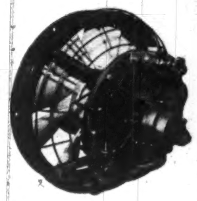
BLOWERS·TURBINES

NEW JERSEY, U. S. A.



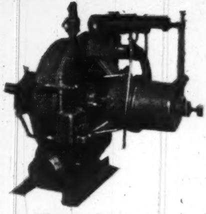
MOTOR-DRIVEN BLOWERS

For oil or gas burners, stokers, pulverized fuel and hand-fired boilers. Vertical or horizontal mounting; on floor or on wind boxes or air heaters. For statics up to 10 in., volumes up to 50,000 CFM Manual or automatic capacity variation. Falling horse-power characteristics with dampering. Static efficiencies up to 80%. Bulletin SW-48.



TURBINE-DRIVEN BLOWERS

Easily installed on burner fronts or boiler settings, providing precise-draft control, manually or automatically, eliminating duct work and large space requirements. Particularly adaptable for plants where oil-free exhaust steam is available. Negligible operating cost, as most of heat from steam is recovered. Consult Bulletin SW-48.

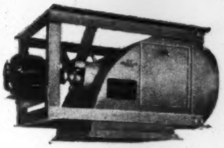


STEAM TURBINES

Used for driving fans, pumps, generators, stokers, etc.

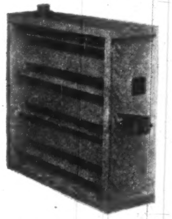
Ranges:	Standard	Hi-Press.
Max. BHP	100	150
Max. Temp.	525°F.	750°F.
Max. Pressure	275 lbs.	600 lbs.
Back Press. to	50 lbs.	50 lbs.
Speeds, up to	4000 RPM	4000 RPM

Horizontal or vertical shaft designs. Clockwise or counterclockwise. Oil-free exhaust steam for heating and process work. Consult Bulletin SW-48.



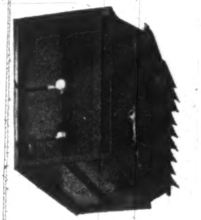
FURNACE DRAFT INDUCERS

Assure positive draft at all times regardless of weather conditions, or of inadequate chimney or breeching construction. Even, constant suction. Insures boiler operation at maximum capacity and efficiency. May be installed directly in flue or in the breeching. For oil, gas, stokered or hand-fired boilers, high-pressure steam plants, or marine boilers. Bulletin I-49.



VARIABLE TEMPERATURE HEATER SECTIONS

Positively will not freeze because entire element is always under full steam pressure. Temperature control not obtained by steam throttling, but heating surface is divided into several narrow divisions with by-passes between. In front of each division and by-pass is a damper. Regulating positioning of dampers controls delivered air temperature. Bulletin HS-3.

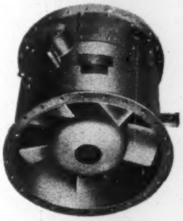


FOG ELIMINATORS

Eliminate fog conditions in dye houses; metal pickling departments; pasteurizing plants; bottle, can and keg washing rooms, etc. Installed in windows, walls, or roof, require no expensive distributing duct systems. Heating is by a Wing Variable Temperature Heating Section. Dissipate fog and eliminate condensation. Bulletin FE-12.

SHIP VENTILATORS

Installed in cowls, assure an abundant supply of fresh air, whether at sea, at dock, or with a following wind. Can be installed in old ships or new without use of space-consuming duct work and without cutting into bulkheads or decks. Will force air into ship or draw it out, as fans may be arranged to run in either direction at will. Bulletin SV-3.



MARINE VENTILATION

Wingfoil Axial Flow Duct Fans designed for marine ventilation are supplied to meet maritime and naval specifications. Wingfoil fan is mounted directly on to totally enclosed dust proof motor suspended within the casing on a steel spider. May be supplied with or without air straightening vanes. Bulletin SV-4.

NEW JERSEY, Newark • NEW YORK, Albany, Buffalo, New York, Rochester, Syracuse • NORTH CAROLINA, Charlotte • OHIO, Cincinnati, Cleveland • OREGON, Portland • PENNSYLVANIA, Erie, Harrisburg, Philadelphia, Pittsburgh, Scranton • TENNESSEE, Memphis • TEXAS, Dallas, Houston • UTAH, Salt Lake City • VIRGINIA, Richmond • WASHINGTON, Seattle, Spokane • CANADA, Montreal, Quebec; Toronto, Ontario; Vancouver, B.C.; Edmonton, Alberta

"Buffalo" Tips on Better Pumping

RIGHT SPECIFYING In The Beginning Prevents POST-INSTALLATION HEADACHES

TELL YOUR PUMP SUPPLIER *Everything About the Job!*

- Since every pump is designed to perform best under certain conditions, send along a complete description of the expected conditions when sending requests for quotes.

This should include:

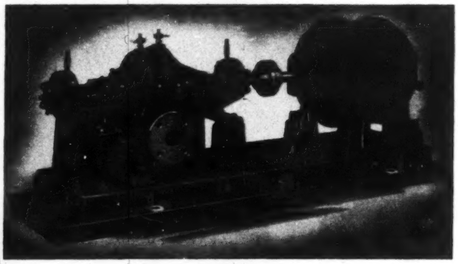
(1) *Description of the liquid:*
temperature, corrosive and/or abrasive characteristics, specific gravity viscosity and vapor pressure under service conditions, and if possible, a chemical analysis. This enables the supplier to recommend the right trim, also the right type and design of pump for the job.

(2) *Capacity — both operating and maximum — in gallons per minute —*
so that a pump may be selected within the range of highest efficiency, yet the sufficient margin for safety.

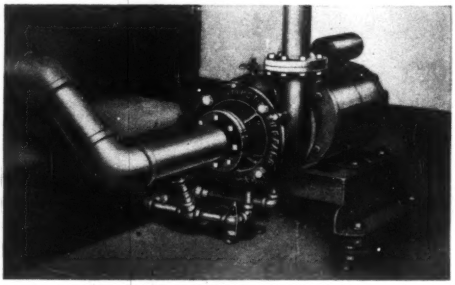
(3) *Type of drive (direct or belt), and type of driver (engine, turbine, motor)*

(4) *Discharge pressure or head of liquid to be pumped.*

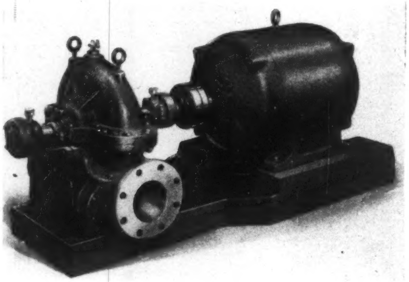
(5) *Suction lift or suction head.*
Complete information assures your getting the right pumps and often enables the manufacturer to suggest an alternative which might be cheaper and more efficient. "Buffalo" engineers will be happy to give you helpful advice on selecting the best pump.



TO OPERATE AT HEADS UP TO 1500 FT. "Buffalo" Type "RR" Clear Water Pumps are available in two-stage and four-stage models, for boiler feed service. Capacities up to 900 gpm. A highly efficient pump with plenty of ability to stand punishment on the job. WRITE FOR BULLETIN 980-B.



FOR CLOSE QUARTERS — the "Buffalo" Close-Coupled Pump is compact and sturdy for clear water service in a wide range of applications. Impeller mounted on motor shaft assures permanent alignment. Complete information in BULLETIN 975-B, yours on request — or contact your trained "Buffalo" representative in the nearest city.



10 to 10,000 GPM SIZES in these rugged, efficient pumps. Double-suction, they are hydraulically balanced. "Buffalo" Pumps can be had for heads up to 300 feet. BULLETIN 955-P, giving all specifications, is yours on request.

"Buffalo" PUMPS

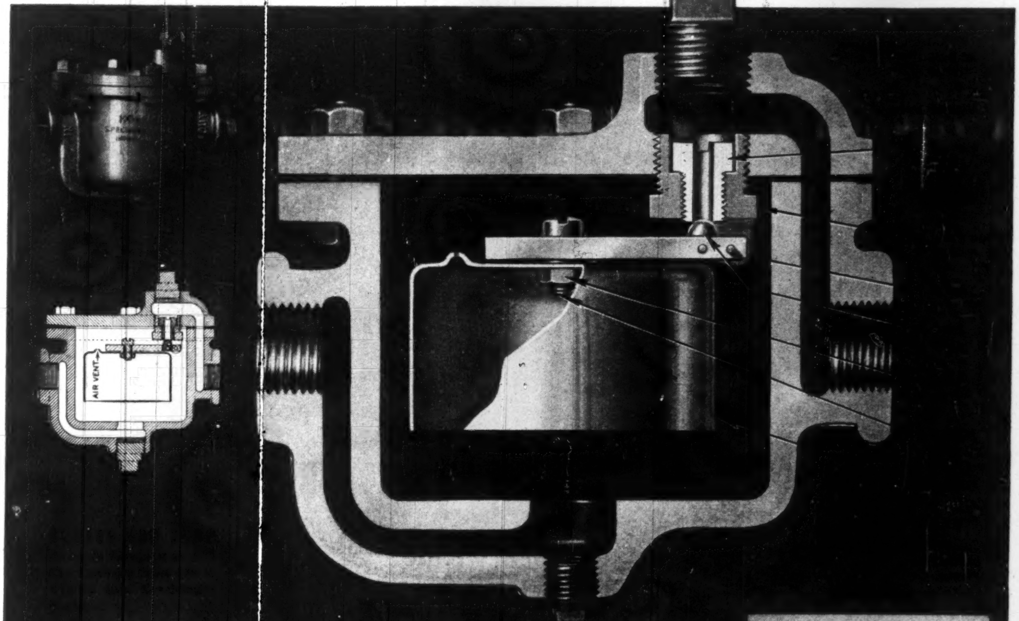
BUFFALO PUMPS INC.

171 MORTIMER STREET BUFFALO, NEW YORK
Canada Pumps Ltd., Kitchener, Ont. *Sales Representatives in All Principal Cities*

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

NOTED FOR *Efficiency...*

This simple mechanism is *Easy* to install *Easy* to service



HOFFMAN

INVERTED BUCKET TRAPS FOR STEAM SERVICE

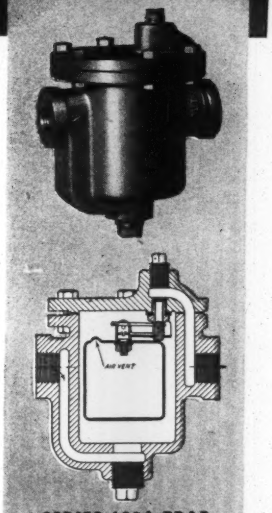
Hoffman Bucket Traps operate intermittently and are particularly applicable to draining condensate and air from steam lines or equipment where large quantities of air and condensate must be discharged. They are easily inspected, cleaned and serviced by merely removing the cover assembly.

Straight-through pipe connections permit close-to-floor installation.

All working parts are connected to the bonnet and are removable with it for service without breaking pipe connections.

These are features of design appreciated by the maintenance man in saving man-hours when man-power is costly and scarce.

Hoffman Bucket Traps are adjustable to a wide choice of pressures—simply by changing valve seats. Send today for full information, no obligation.



SERIES 600A TRAP
Pressure Range 0 to 125 Lbs. Capacity From 600 to 1150 Lbs. Condensate Per Hour

HOFFMAN SPECIALTY CO., Dept. FG-1 1001 York St., Indianapolis 7, Ind.

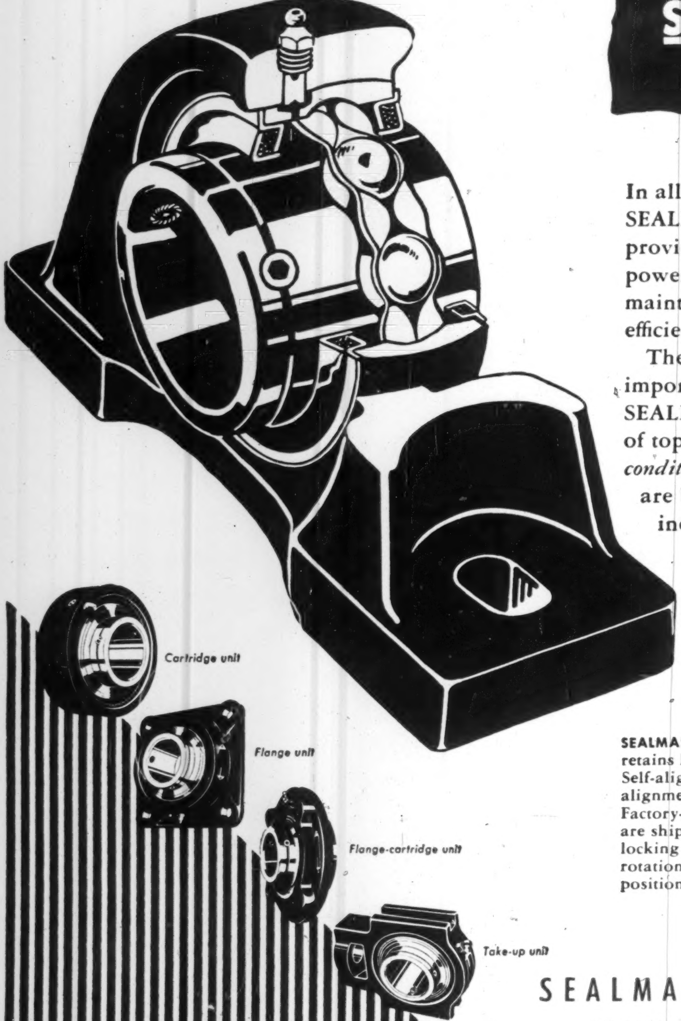
Makers of Valves, Traps, Vacuum and Condensation Pumps, Forced Hot Water Heating Systems.
Sold by leading wholesalers of Heating and Plumbing Equipment.

Wherever used...

THEY ADD BUILT-IN PERFORMANCE

SEALMASTER

BALL BEARING UNITS



In all types of machines, SEALMASTER Ball Bearing Units provide smoother operation, reduced power consumption, minimum maintenance and general all-round efficiency.

The exclusive combination of important features found only in SEALMASTERS is the best assurance of top performance *under all conditions*—superior qualities that are built right into each individual bearing.

Write for your copy of Catalog 845 which gives dimensions, load ratings and other data on the complete line of SealMaster Bearing units. If you have a special bearing problem ask one of our bearing specialists to assist you.

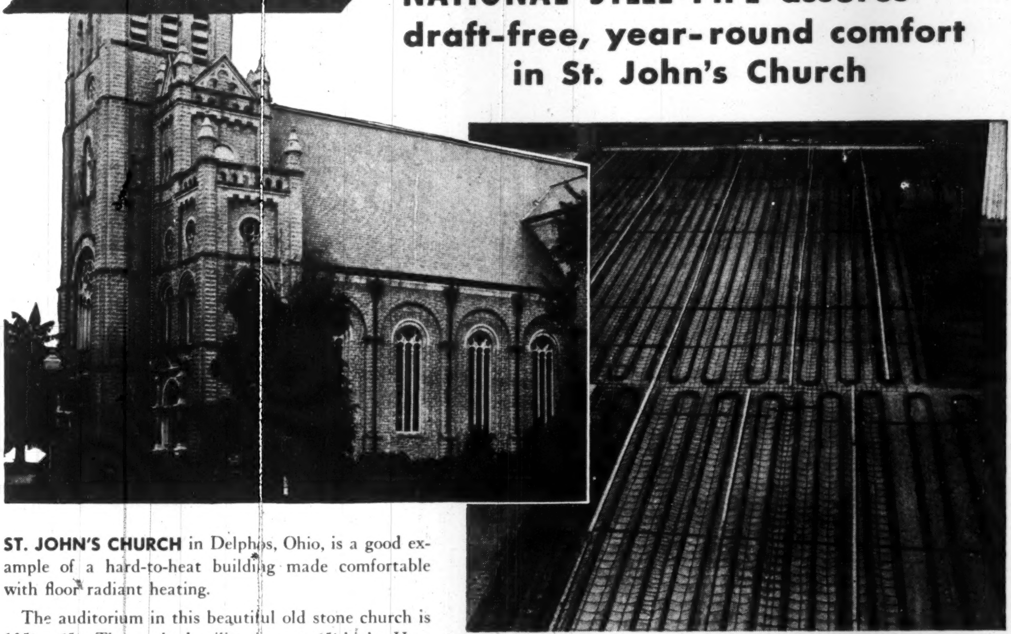
SEALMASTERS' patented centrifugal seal retains lubricant and excludes dirt. Self-aligning bearing assembly permits alignment without seal distortion. Factory-lubricated, ALL SEALMASTERS are shipped *ready for use.* Patented locking pin and dimple prevents rotation of outer race in housing and positions unit for relubrication.

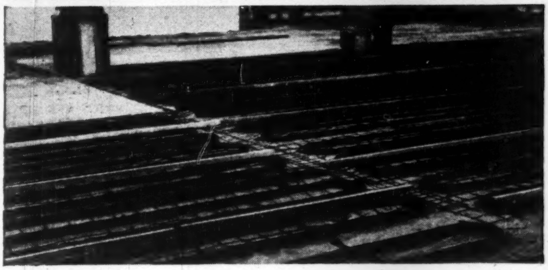
SEALMASTER BEARINGS

47 RIDGEWAY AVENUE, AURORA, ILLINOIS
A DIVISION OF STEPHENS-ADAMSON MFG. COMPANY

FACTORY REPRESENTATIVES AND DEALERS IN ALL PRINCIPAL CITIES

NOW . . . modern radiant heating with NATIONAL STEEL PIPE assures draft-free, year-round comfort in St. John's Church





ST. JOHN'S CHURCH in Delphos, Ohio, is a good example of a hard-to-heat building made comfortable with floor radiant heating.

The auditorium in this beautiful old stone church is 135′ x 65′. The vaulted ceiling is over 65′ high. Here was a natural for radiant heating.

To keep installation costs down, the insulating paper was laid right over the old wood floor. Then came ¾″ steel bars. Finally, 10,110 feet of 1¼″ National Steel Pipe was tied to the bars and over this a 2″ layer of concrete was poured.

Now, at last, the floors are warm. The entire auditorium is comfortable. And the room is free from obstructions, hot spots and cold spots.

Why did they use National *Steel* Pipe? For one thing, it's economical in cost . . . it is readily welded, it is strong, yet sufficiently ductile to permit easy bending. But best of all is its record for long life and trouble-free service. It has been standard for conventional hot water heating for over 60 years.

OUR FREE 48-PAGE BOOK will help you design better radiant heating systems. It includes data for estimating heat losses, designing coil systems for floor and ceiling installations, typical coil patterns, testing procedures, fitting resistances, insulating techniques, pipe data and heat transmission tables. Send the coupon now.

NATIONAL TUBE DIVISION
525 William Penn Place
Pittsburgh 19, Pa.

Please send me your free Bulletin No. 19, "Radiant Heating."

Name..

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NATIONAL TUBE DIVISION

UNITED STATES STEEL COMPANY, PITTSBURGH, PA.

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

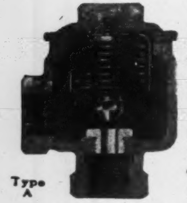
UNITED STATES STEEL

W. H. NICHOLSON & COMPANY

198 OREGON STREET — STOCKS OF STEAM TRAPS CARRIED BY AGENTS IN ALL PRINCIPAL CITIES — WILKES-BARRE, PA.

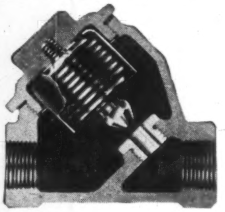
NICHOLSON INDUSTRIAL STEAM TRAPS

NICHOLSON INDUSTRIAL STEAM TRAPS have many important and exclusive features which make them ideal for draining condensate from all types of steam heating and processing equipment.



Type A

Recommended for the individual drainage of Unit Heaters, Radiators, Pipe Coils, Steam Mains, Drips, Hot Water Heaters, Driers, Jacketed Kettles, Cookers, Coffee and Hot Water Urns, Dish Heaters, Vegetable Steamers, Bakers' Proof Boxes, Steam Tables, Dry Kilns, Plastic Moulding Platens, Sterilizers, Ironers, Presses, Mangles, etc.

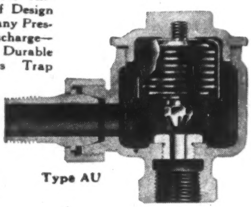


Type AHV

Large Capacity — No Air-Binding—Freeze Proof Design—No Adjustment for any Pressure—Intermittent Discharge—Strongest and Most Durable Thermostatic Bellows Trap Manufactured.

Types A, AHV and AU

For Pressures From Vacuum to 200 lbs. Bronze Construction—Aluminum Painted.



Type AU

***Maximum Capacity in Pounds per Hour at Various Pressures—Types A, AHV and AU**

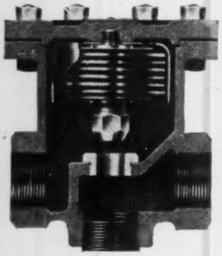
Size, Inches	1 Lb.	2 Lbs.	5 Lbs.	10 Lbs.	15 Lbs.	20 Lbs.	40 Lb.
¼—⅜	865	1,220	1,915	2,695	3,290	3,780	5,290
½—¾	865	1,220	1,915	2,695	3,290	3,780	5,290
1	1,020	1,440	2,270	3,190	3,900	4,475	6,250

Size, Inches	50 Lbs.	60 Lbs.	80 Lbs.	100 Lbs.	125 Lbs.	150 Lbs.	175 Lbs.	200 Lbs
¼—⅜	5,885	6,400	7,310	8,120	8,925	9,775	10,400	11,090
½—¾	5,885	6,400	7,310	8,120	8,925	9,775	10,400	11,090
1	6,955	7,590	8,660	9,600	10,570	11,590	12,310	13,100

List Prices—Types A, AHV and AU

Size, Inches	Types A and AHV			Type AU			Valve Orifice, Inches
	With Bellows of			With Bellows of			
	Bronze	Monel	Stainless	Bronze	Monel	Stainless	
¼—⅜—½	$17 60	$20 90	$24 90	$19 05	$22 40	$26 40	5/16
¾	19 05	22 40	26 40	20 50	23 85	27 85	5/16
1	21 30	23 65	28 65	23 45	26 80	30 80	21/64

Types A, AU and C are made in angle type only, with horizontal inlet and vertical outlet—Type AU has union connection on inlet. All three types drain completely when cold and will not freeze. Type AHV especially applicable to drainage problems where necessary or desirable to have all piping run horizontally or vertically, or close to floor, wall or pillar. Type B, made with horizontal inlet and optional horizontal or vertical outlet offers either angle or horizontal straight-through connections. Types AHV and B traps are not freeze-proof.



Type B

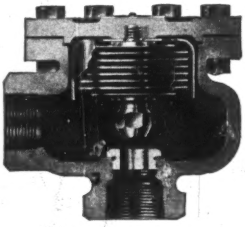
Types B and C

For Pressures from Vacuum to 225 lbs.—Types B & C—Cast Iron Construction—Aluminum Painted.

For Pressures to 300 lbs. with Superheat—Type C Traps only—Cast Steel Construction with Stainless Steel Bellows.

List Prices—Types B and C

Size, Inches	Types B and C			Type C Only		Valve Orifice, Inches
	Cast Iron With Bellows of			Cast Steel With Bellows of		
	Bronze	Monel	Stainless	Monel	Stainless	
½	$25.85	$29.20	$33.70	$41 35	$45.45	⅜
¾	33 90	38.30	45.25	53 70	60 30	7/16
1—1¼	40 40	43.95	50.15	63.00	69.65	½
1½—2	59.80	64.45	71.10	91 00	97.65	¾



Type C

***Maximum Capacity in Pounds per Hour at Various Pressures—Types B and C**

Size, Inches	1 Lb.	2 Lbs.	5 Lbs.	10 Lbs.	15 Lbs.	20 Lbs.	40 Lbs.	50 Lbs.	60 Lbs.	80 Lbs	100Lbs.	125Lbs.	150Lbs.	175Lbs.	200Lbs.	225Lbs.	Cast Steel	
																	250Lbs.	300Lbs.
½	1,140	1,610	2,530	3,560	4,350	4,990	6,980	7,775	8,460	9,660	10,720	11,800	12,920	13,750	14,640	15,380	16,090	17,400
¾	1,695	2,385	3,760	5,290	6,450	7,420	10,350	11,540	12,560	14,350	15,910	17,500	19,190	20,400	21,720	22,800	23,870	25,820
1—1¼	2,120	2,985	4,700	6,610	8,070	9,260	12,960	14,430	15,710	17,930	19,900	21,880	23,980	25,500	27,200	28,500	29,850	32,300
1½—2	3,200	4,510	7,100	9,990	12,200	14,000	19,600	21,800	23,750	27,120	30,100	33,100	36,300	38,600	41,100	43,200	45,150	48,900

*Capacities shown are maximum for average operating conditions with valve orifice wide open for one hour. To prevent continuous trap operation or condensate back-up, traps should be selected which have capacities from two to ten times the expected normal condensation load, using the lower factor when all operating conditions are favorable, and varying from that figure up to the highest factor, depending on quantity and severity of adverse conditions encountered.

FEATURES

FOR COMPLETE DETAILS regarding Nicholson Industrial Steam Traps send for BULLETIN 450

LARGE CAPACITY—From two to six times greater valve area and capacity than average traps.

NO AIR-BINDING—All types discharge air just as efficiently as condensate. May be used as air vents for mechanical traps, return traps, receivers, water heaters, etc.

NO DRIBBLING—Intermittent action of water-sealed discharge valve—Wide open when trap is cold—Closes immediately when steam contacts bellows.

NO FREEZE-UPS—Types A, AU and C completely drain when cold and will not freeze on out-door applications.

NO ADJUSTMENT—Same size valve and seat requiring no change or adjustment for any pressure from vacuum to the maximum allowable with construction used. Traps may be moved from low to high pressure applications, or vice versa.

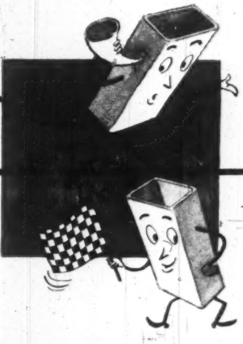
NO WATER-LOGGED UNITS—Requires but a few degrees temperature differential between steam and condensate to open valve—Low cost and small size make individual trapping possible and economical.

CONSTRUCTION FEATURES—Renewable hardened stainless steel valves and seats—Large diameter phosphor bronze bellows hydraulically formed from seamless tube, with brazed (not soldered) naval brass end fittings, furnished in traps of bronze and cast iron construction—Stainless Steel bellows, electric resistance seam welded to 18-8 stainless end fittings, furnished in cast steel traps; also available at extra cost with bronze and cast iron traps, for bad water conditions.

Other Products—Piston and Weight Operated Steam Traps, Compressed Air Traps, 3 and 4-Way Cylinder Control Valves, Steel and Stainless Steel Floats, Etc.

Careyduct

ALL-ASBESTOS AIR DUCT



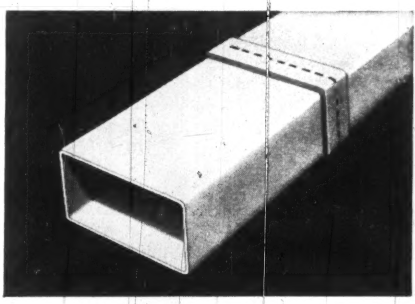
QUIETS air movement

speeds-up installation

Careyduct

CONSERVES CRITICAL METAL, TIME AND LABOR COSTS ...POSSESSES REVOLUTIONARY NEW ADVANTAGES!

Asbestos from core to cover, Careyduct is the *leading* choice of *leading* architects and builders because it offers a combination of advantages found in *no* other duct. It's light in weight, yet strong and rigid . . . low in cost, yet high in efficiency . . . goes up easily and fast, saves time and cuts cost!
Careyduct is approved by Underwriters' Laboratories; cannot rot, rust or burn; is job-proved on important installations from coast to coast. Order it in standardized prefabricated sections for slip-joint assembly in *two* all-purpose forms!

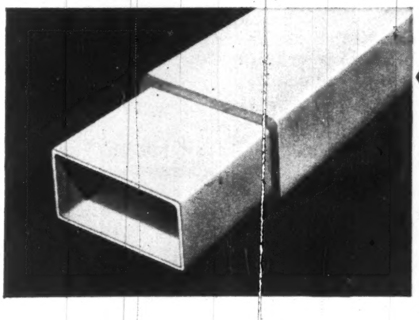


←1

Single Wall Careyduct

FOR WARM AIR HEATING SYSTEMS

"SW" Careyduct hushes pops, groans and creaks that "telegraph" through ordinary metal ducts during furnace "on" and "off" periods. Its insulating properties conserve fuel, speed furnace-to-room heat up time. "SW" Careyduct is also ideal for cold air returns and ventilating conduits. The 3′ prefabricated sections are joined by a collar, similar in texture and thickness to the duct itself.



←2

Insulated and Acoustical Careyduct

FOR AIR CONDITIONING SYSTEMS

"I&A" Careyduct "soaks up" sound . . . hushes air noise . . . absorbs fan *rumbles* and *grumbles* . . . makes possible whisper-quiet air conditioning systems in new buildings or old. "I&A" Careyduct handles air velocities up to 2500 feet per minute; permits installation of smaller ducts where space is limited. The 3′ sections are designed for rapid, trouble-free installation with ordinary tools.

*Under Union jurisdiction, Careyduct is installed by the Sheet Metal Trades.

Both types of Careyduct come in a range of sizes from 2½″ x 5½″ to 23½″ x 23½″ in width, and in special sizes up to 17½″ x 35½″. Also in round sections from 3″ to 30″ in diameter. And in a complete range of standard fitting accessories.

Get the full story! Learn how you can save metal, time and manpower . . . improve *your* profit picture, too! Phone your Carey representative, or send for your free copy of our new Careyduct Manual. No obligation!

Carey

The Philip Carey Mfg. Co., Lockland, Cincinnati 15, Ohio

Why is the **scrap** situation so **critical?**

An interview with J. L. MAUTHE, President
The Youngstown Sheet and Tube Company

Why are you concerned about iron and steel scrap, Mr. Mauthe?

Our inventories are critically low and the present scrap flow is not sufficient to maintain capacity steel plant operations. Furthermore, if the flow of scrap is not increased, a curtailment of steel production is inevitable.

The industry is using all the pig iron and all the home scrap that is available. The balance of our metallic requirements must be made up through procurement of purchased scrap. Every ton of scrap that we do not get represents a ton of steel that we cannot make.

How much scrap does the industry need?

In 1950, 96,700,000 tons of steel ingots and castings were produced, requiring over 61,000,000 tons of iron and steel scrap.

In 1951, over 65,000,000 tons of scrap will be required, and even more will be needed in 1952.

Where does scrap come from?

About 58% of the total scrap required is produced by the ingot and casting makers, and is known as "home" scrap; the balance of 42% is "purchased" scrap and is procured from outside sources.

Purchased scrap generally falls into two categories: Scrap from current fabrication and that which is the result of obsolescence.

There are three important sources from which we get obsolete scrap, much of which is dormant:-

1 - Obsolete machinery and equipment in every industrial plant, at the oil fields and on the farms.
2 - Battlefield scrap, obsolete ships and war material, surplus machinery and equipment, which government can make available.
3 - Countless old automobiles and trucks, which are rusting away in automobile wrecking yards in every section of the country.

What can be done to increase tonnage of purchased scrap?

This scrap must be made available immediately! All industry and government must awaken to the critical nature of the situation. They must realize that if we do not get the scrap, they will not get the steel!

YOU CAN HELP - YOU MUST HELP!
NO SCRAP - NO STEEL

QUALITY
YOUNGSTOWN
SERVICE

The Youngstown Sheet and Tube Company - Youngstown, Ohio

FOR PERFORMANCE YOU CAN **BANK** ON

FUEL SAVINGS
$

Operating economy *is* an important factor in the selection of steam generating equipment; but equally important is dependability. These two basic considerations are such well-known attributes of Superior Steam Generators that Superior units are repeatedly specified for public utilities, hospitals, industrial plants, and similar critical installations.

Superior Steam Generators are built to develop their maximum rated capacities at thermal efficiencies guaranteed to exceed 80% . . . not for a day, or a month, but for years to come.

You can *bank* on their savings due to operating economy . . . but, more important, you can *bank* on the dependability of Superior Steam Generators for years of trouble-free service.

FOR COMPLETE DETAILS, WRITE TODAY FOR THE NEW FULLY ILLUSTRATED CATALOG 404 . . .

Fully automatic. Burns gas, or oil, or both.
18 sizes ranging from 20 up to 600 b.h.p.
for pressures to 250 p.s.i. or for hot water.

for performance you can ***BANK*** *on*

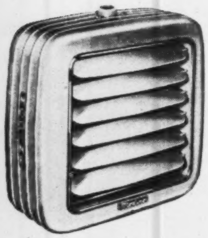
SUPERIOR
STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 18, N.Y.

LOOK TO MODINE

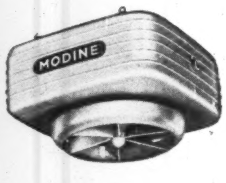
for the finest in modern heating

MODINE UNIT HEATERS FOR STEAM, HOT WATER AND GAS



Horizontal Delivery Type

Built for general industrial and commercial applications, the Modine Horizontal Delivery Unit is produced in 23 models. Discharge air temperatures of 110°-120° F are correctly related to air velocities — assure perfect heating comfort, lower fuel costs.

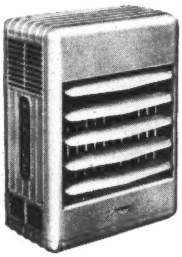


Vertical Delivery Type

Available in 16 different models designed for high overhead installation — or at low levels. Coordinated with the horizontal and power-throw models, the Modine Vertical Unit Heaters can also be used individually or in combination with the fully integrated line.

Power-Throw Type

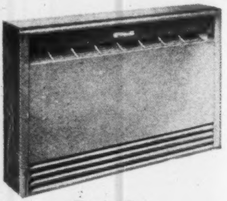
Offers powerful, long-throw air delivery for maximum heat distribution over a wide area. In warehouses and other large buildings, a few Power-Throw models often replace a larger number of standard units with resulting economies in equipment and piping.



Gas-Fired Type

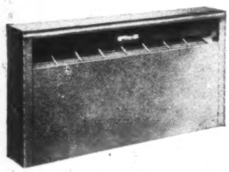
Advanced-design line built in five sizes. Features include corrosion-resistant, stainless steel heat exchanger and burner for durability, new light weight, better heating performance. A. G. A. approved for use with natural, manufactured, mixed, and L. P. gases.

MODINE CONVECTOR RADIATION FOR STEAM OR HOT WATER SYSTEMS



Type F

Ideal for either complete or partial recessing in a wall or for open installation against a wall. Louvered lower grille shown is optional. Built in Institutional type also.

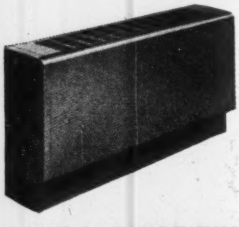


Type W

Hung on the wall, this type is used where frequent cleaning of the floor underneath convector is required. Distinctive lines of Type F are retained. Also offered in Institutional type.

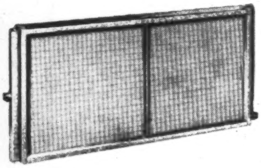
Type S

Wall-hung type, with air outlet grille incorporated in sloping top. Slightly higher heating capacity. Offered in standard enclosure or heavy-duty Institutional models.



MODINE CABINET UNITS

In models from 120 to 640 Edr for floor, wall or ceiling installation. Provides quiet, quick and positive heat distribution, with or without ducts in commercial and public buildings.



MODINE HEATING COILS

More than 1200 high capacity heating coils designed for steam and hot water. Standard and steam distributing types in sizes from ½ to 30½ sq. ft.

Modine
MANUFACTURING COMPANY
1509 DeKoven Ave., Racine, Wis.

See your phone book classified section for the Modine representative in all principal cities.

UR-1139

IT ALWAYS PAYS TO SPECIFY

LADISH

Controlled Quality

PIPE FITTINGS

16" STD. LADISH WPB Ⓛ AKF

TO MARK PROGRESS

...you get full value for every fittings dollar

The more critically you appraise value... the more you will appreciate Ladish Controlled Quality Fittings. For the ultimate economy of Ladish Fittings is assured by laboratory, engineering and manufacturing controls unsurpassed for thoroughness and rigid standards. From metallurgy through machining ... repeated tests safeguard the extra strength and soundness vital to long dependable service ... extra value you can always depend on from Ladish Controlled Quality Fittings.

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF... ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago • St. Paul
St. Louis • Atlanta • Houston • Tulsa • Los Angeles • Havana • Toronto • Mexico City

New, Fast-Acting, Automatic "SMOKE-FIRE DETECTIVE"

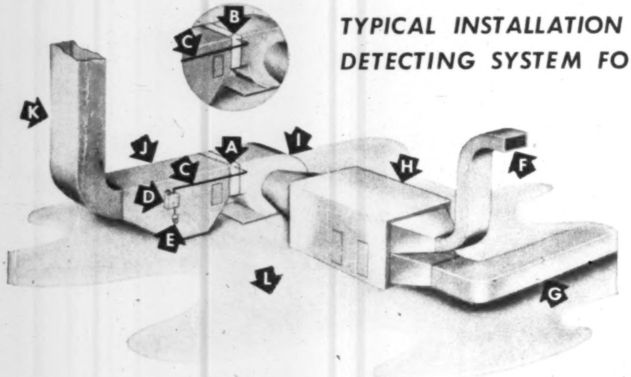
For Air Conditioning

Smoke in your air conditioning spreads fast . . . causes panic, spoilage and needless expense . . . now all can be avoided by installing a modern, fully approved C-O-TWO Automatic Smoke Detecting System.

Smoke, smoldering and fire are spotted in the incipient stage anywhere throughout the air conditioning ducts, as well as via the return air from air conditioned spaces. Four types of smoke detectors and several different installation arrangements are available to fit your particular needs . . . for small air conditioning units, for large air conditioning systems, and whether with or without electrostatic precipitators. All C-O-TWO Automatic Smoke Detecting Systems function by drawing continuous air samples through simple piping to a smoke detector. The first trace of smoke sets off an alarm, based on an exclusive operating principle . . . no chance of smoke spreading . . . the air conditioning instantly shuts down, dampers close and fire extinguishing systems actuate.

Act now for complete free information and descriptive literature on this newest contribution to modern fire fighting. An expert C-O-TWO Fire Protection Engineer will be glad to help you in planning economical, fully approved fire protection facilities without obligation. (Special assistance rendered to qualified air conditioning contractors.)

TYPICAL INSTALLATION C-O-TWO AUTOMATIC SMOKE DETECTING SYSTEM FOR AIR CONDITIONING DUCTS



A perforated smoke accumulating pipe
B smoke accumulating pitot tube (alternate)
C pipe line for carrying continuous air samples to smoke detector
D smoke detector
E audible alarm
F fresh air intake and duct
G return air duct
H air cleaning unit
I air fan
J air cooling and heating unit
K supply air duct
L floor level

TRADE MARK
C-O-TWO
REG U.S. PAT OFF

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY
Sales and Service in the Principal Cities of United States and Canada
Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT
Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers • Built-In Smoke and Heat Fire Detecting Systems
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems

Announcing the New

TRADE LESLIE MARK

DOUBLE SEATED DIAPHRAGM VALVES

— for use with CONTROL INSTRUMENTS

Offering these Important Features:

★ "FLOW-LINE" CONTOURED BODY — provides high capacity at low pressure drop.

★ STANDARD ISA FACE-TO-FACE DIMENSIONS

★ STELLITED SEATING SURFACES

★ RENEWABLE SELF-ALIGNING GUIDES

★ POWERFUL, COMPACT FRICTION-FREE DIAPHRAGM SUPERSTRUCTURE

★ THROUGH-BOLT CONSTRUCTION ON STEEL VALVES

★ WIDE RANGEABILITY

★ SEAT RINGS EASILY REPLACED WITH VALVE IN PIPELINE — not necessary to set up in a lathe or grind in at high temperature.

LESLIE
1½ LESLIE
1½ LESLIE
V

Class DV

WRITE FOR Bulletin 513

Available with various size superstructures. Sizes 1½" to 10" in Cast Steel and Cast Iron.

Look for LESLIE REGULATORS under "Valves" or "Regulators" in your classified telephone directory in the following cities where LESLIE factory trained engineers are located

Albany, N. Y.
Albuquerque, N. M.
Atlanta, Ga.
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Beaumont, Texas
Birmingham, Ala.
Boston, Mass.
Bridgeport, Conn.
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Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Dallas, Texas
Denver, Colo.
Des Moines, Ia.
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Duluth, Minn.
Greensboro, N. C.
Greenville, S. C.
Houston, Texas
Kansas City, Mo.
Kingsport, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Miami Springs, Fla.
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Minneapolis, Minn.
Mobile, Ala.
New Orleans, La.
New York, N. Y.
Orlando, Fla.
Philadelphia, Pa.
Pittsburgh, Pa.
Ponca City, Okla.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
Rutherford, N. J.
Salt Lake City, Utah
San Francisco, Cal.
Seattle, Wash.
St. Louis, Mo.
Syracuse, N. Y.
[illegible], N. Y.
Tucson, Ariz.
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Youngstown, Ohio
Montreal, Que., Can. Toronto, Ont., Can. Vancouver, B.C. [illegible]

ESTABLISHED 1900
LESLIE CO.

237 Grant Avenue, Lyndhurst, New Jersey

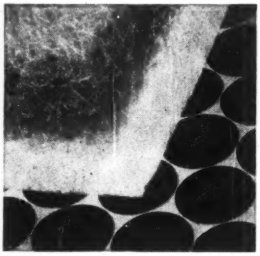
PRESSURE REDUCING VALVES • PRESSURE CONTROLLERS
FLOATLESS LEVEL CONTROLS • PUMP GOVERNORS • TEMPERATURE REGULATORS
SELF CLEANING STRAINERS • AIR HORNS • STEAM WHISTLES

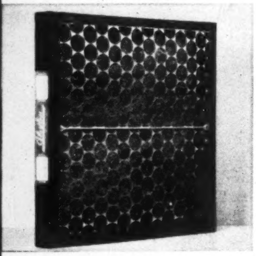
Glasfloss

A COMPLETE LINE . . . FOR ALL FORCED AIR HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

GLASFLOSS I-S FILTER

For peak air cleaning efficiency, the GLASFLOSS I-S Air Filter Unit is the answer. Here a strainer mat has been added to the famous long, glass fibers that make up the standard GLASFLOSS Air Filter pad. The combination brings air filtering efficiency to as high as 95%. No other air filter on the market can compare.





GLASFLOSS STANDARD FILTER

This is the conventional type — the filter most in demand. The long, fine glass fibers provide a greater surface area to catch and hold more dust with less air resistance. The Glasfloss STANDARD Filter is primarily intended for home heating equipment and normal industrial installations. Available in all standard sizes.

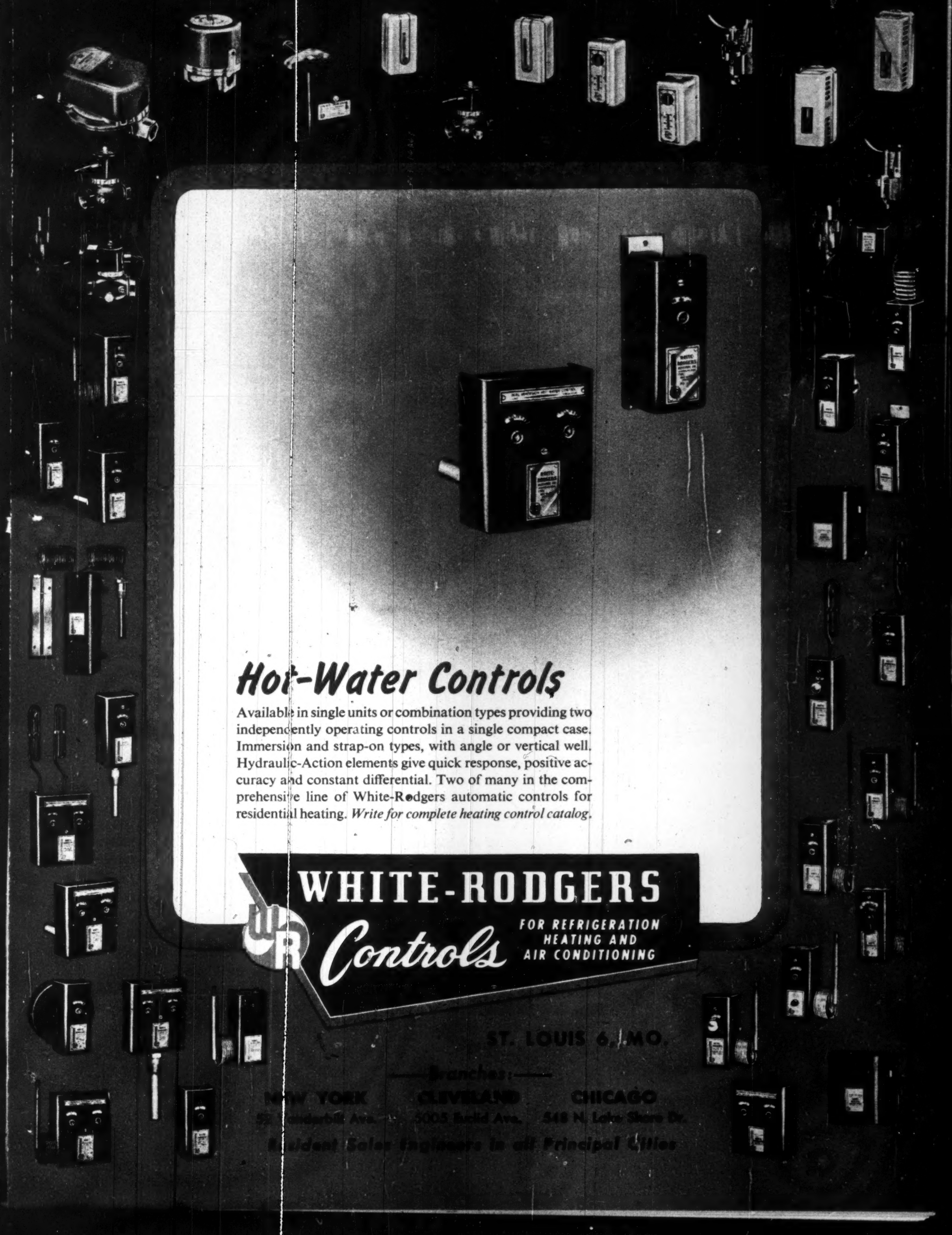
...the best, most complete, most profitable line on the market

GLASFLOSS ROLL-PAK

Here is a product carefully planned for bulk users. Cut your own filter pads—fit them into your own frames and save, with every change, as much as 30% of your air filter costs. Available in rolls, 40" wide and 10' long and in 1" and 2" thickness. Application is easy. Just roll it out, cut to size and put into position. The fluffy, fine fibers are easy on the hands.

For Complete details on any product in the GLASFLOSS Line, write Dept. HP-1

Glasfloss 155 EAST 44th STREET, NEW YORK 17, N. Y.



Hot-Water Controls

Available in single units or combination types providing two independently operating controls in a single compact case. Immersion and strap-on types, with angle or vertical well. Hydraulic-Action elements give quick response, positive accuracy and constant differential. Two of many in the comprehensive line of White-Rodgers automatic controls for residential heating. *Write for complete heating control catalog.*

WHITE-RODGERS

WR *Controls* FOR REFRIGERATION HEATING AND AIR CONDITIONING

ST. LOUIS 6, MO.

—Branches:—

NEW YORK
52 Vanderbilt Ave.

CLEVELAND
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CHICAGO
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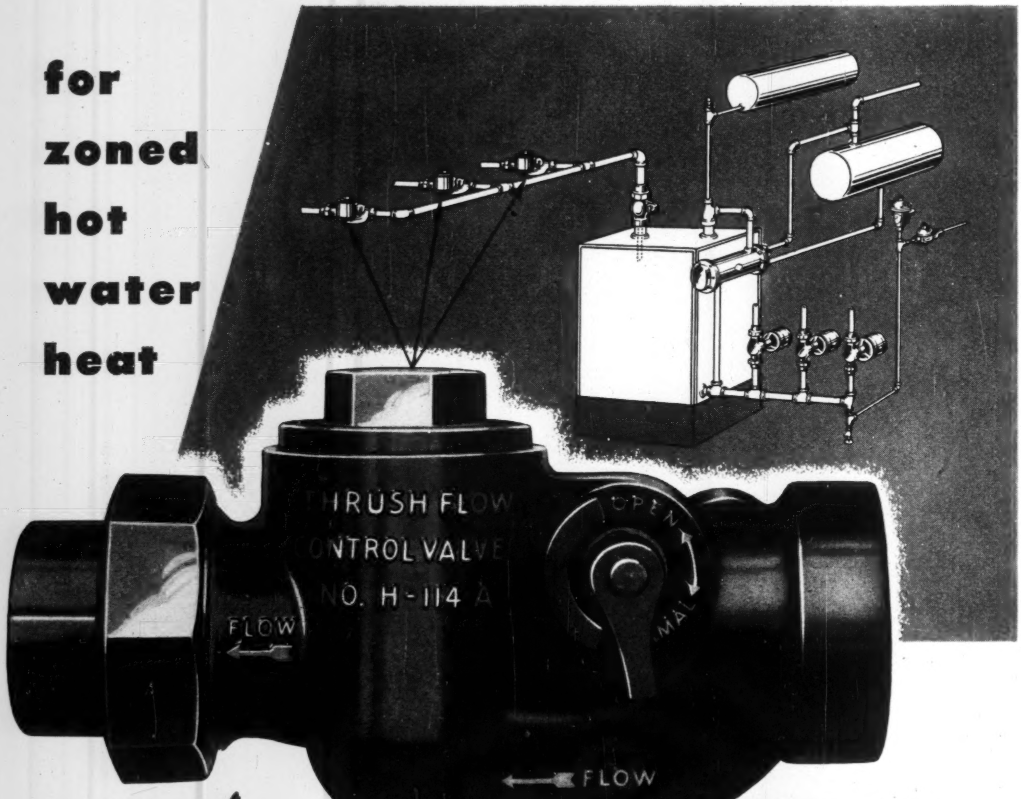
Resident Sales Engineers in all Principal Cities

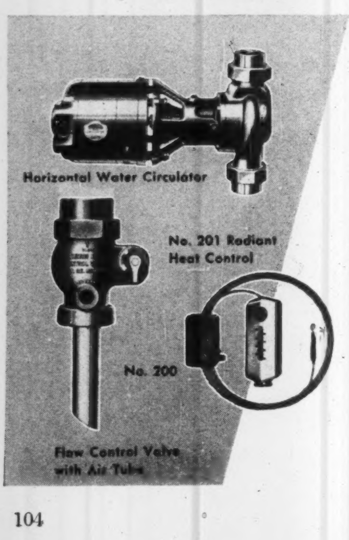
for zoned hot water heat


THRUSH FLOW CONTROL VALVE NO. H-114 A
FLOW
OPEN
FLOW

the New THRUSH

HORIZONTAL FLOW CONTROL VALVE

HERE'S THE valve you need for zoning hot water heat. Just the thing for low basements. It saves pipe, simplifies installation and gives more head room . . . especially important on long runs. As the illustration shows, this valve feeds straight out from the main and saves several inches of head room over angle type valves. There's a Thrush Flow Control Valve for every need . . . the line is complete with angle and vertical valves, with or without air tube, and the new horizontal space-saving valve announced here. All have the same time-tested operating principle and working parts. For easy zoning of hot water heat and assured customer satisfaction, install the complete forced circulating Thrush Flow Control System. See your wholesaler today or write Department E-1.

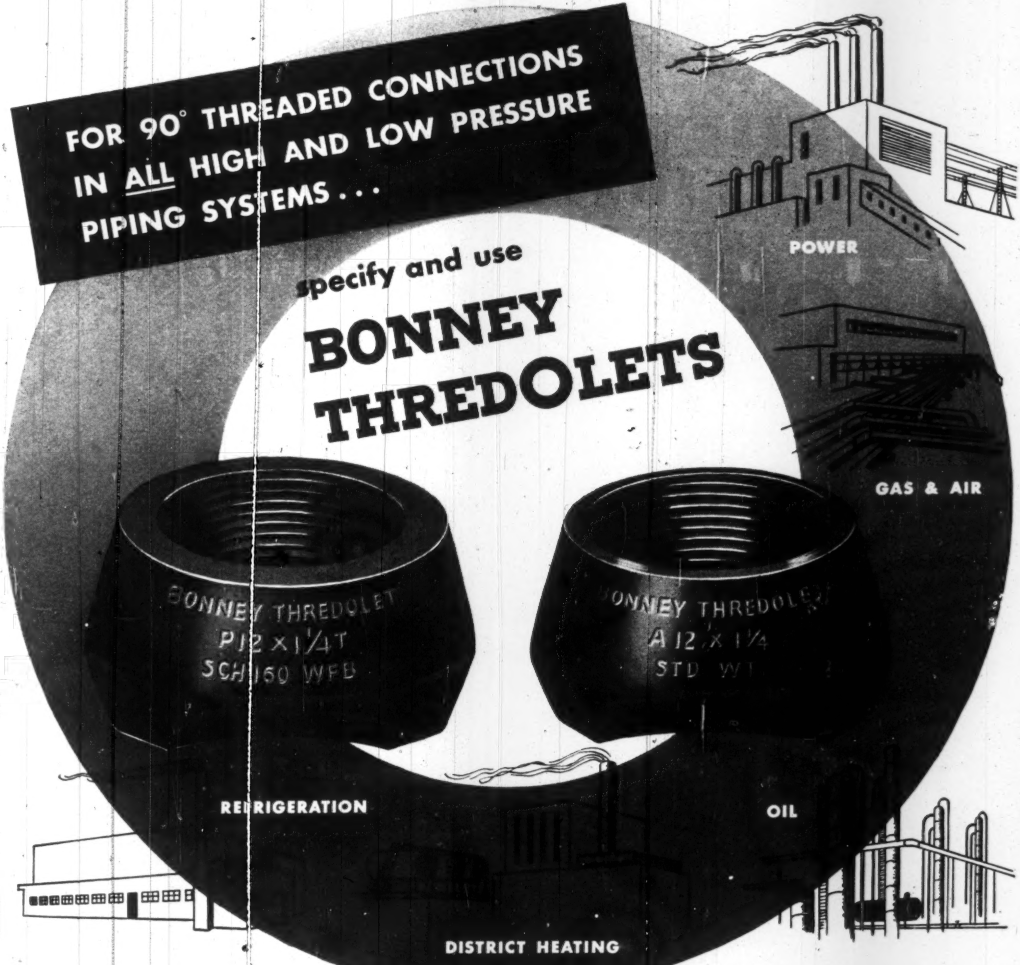

Horizontal Water Circulator
No. 201 Radiant Heat Control
No. 200
Flow Control Valve with Air Tube

H. A. THRUSH AND COMPANY
PERU, INDIANA

FOR 90° THREADED CONNECTIONS
IN ALL HIGH AND LOW PRESSURE
PIPING SYSTEMS . . .

specify and use

BONNEY THREDOLETS



YOU DERIVE THE FOLLOWING ADVANTAGES:

1. ACCELERATED FABRICATION—

with ThredOlets no coupling preparation is necessary—you obtain the most economical type of construction.

2. NEAT AND UNIFORM APPEARANCE—

ThredOlets minimize variations caused by human element—you attain the best engineered type of construction.

3. IMPROVED FLOW—

ThredOlets provide a funnelled inlet—you achieve better performance and better piping system design.

4. DIMENSIONAL STANDARDIZATION—

with each ThredOlet installation, you have constant control of the critical center-of-run-pipe to face-of-outlet dimension.

The Bonney WeldOlet Welding Fittings Catalog, No. W-3, provides complete engineering and dimensional data.
Write for your free copy.

WELDING FITTINGS DIVISION

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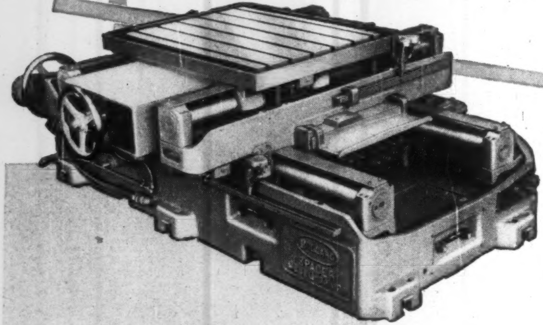
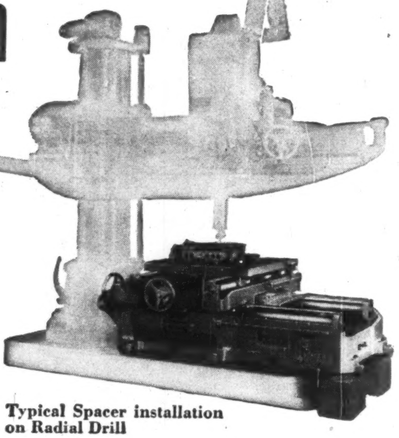
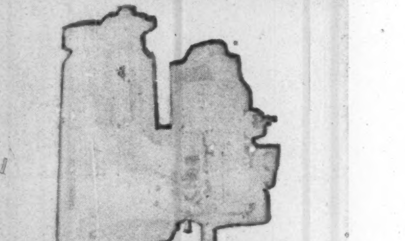
EVOLUTION..... FIRST JIGS *then* BULLARD SPACER





Typical Spacer installation
on Radial Drill



For Higher Degrees of
Accuracy, the Spacer is installed on
Cincinnati Super Service fixed arm Drill

Jigs and templates are the old original means of repetitive production of a pattern of accurately spaced holes.

Today, through Evolution and Engineering Skill, Bullard has developed a FASTER, more Accurate and LESS COSTLY Method for this type of work.

Interchangeability of parts in small quantities at minimum cost is most important in modern manufacturing.

NO TIME REQUIRED FOR:—

Jig Design	**Jig Handling**
Jig Processing	**Jig Storing**

NO OPERATOR FATIGUE in locating and relocating of Drill Arm. See further comparisons in Spacer catalog. When writing, mention "EVOLUTION".

THE BULLARD CO.

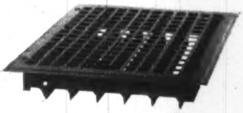
BRIDGEPORT 2,
CONNECTICUT

FOR [illegible] HEATING AND AIR-CONDITIONING NEEDS, CHOOSE FROM THIS

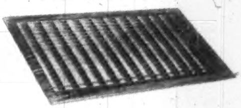
Complete Line of Registers and Grilles

A-J

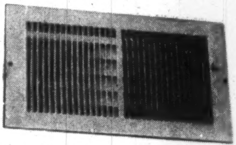
WALL REGISTERS
Available with Lock Attachment



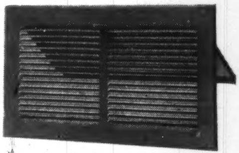
FLOOR GRILLES
Close Mesh



REGISTERS FOR FORCED AIR
Available with Matching Grilles



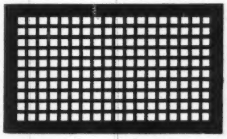
Multiple Valve



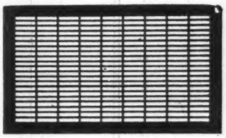
Single Valve

70-B Grille

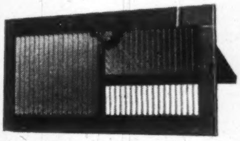
ARCHITECTURAL GRILLES



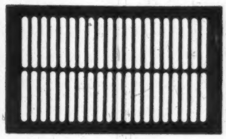
Plain Lattice Designs



Slotted Designs

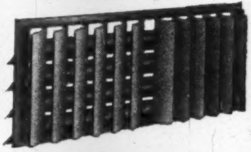


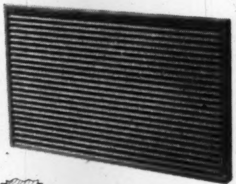
Single Valve

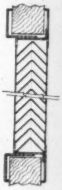


Design D Grille

DIFFUSERS
Double or Single







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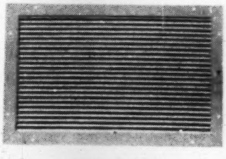
Door or Partition

Auxiliary flange frame, slide fit telescoping.



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FALSTAFF® reduces costs... maintains *Premium Quality*

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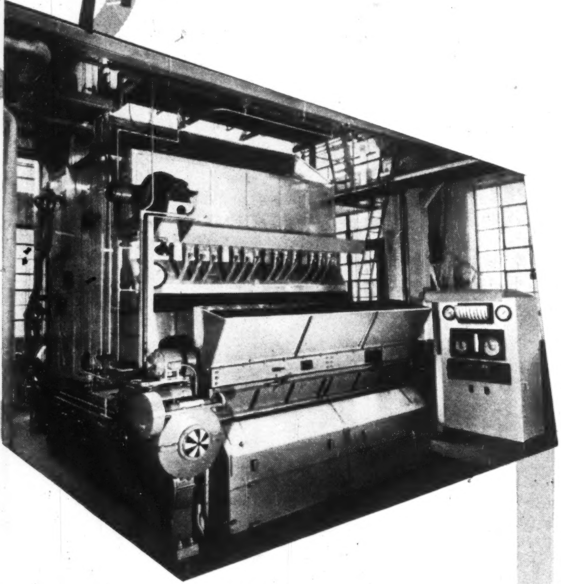
Most recent of six B&W Integral-Furnace Boilers, installed in Falstaff breweries at St. Louis, Omaha and New Orleans.

Local unwashed Illinois coal is $1:10 a ton cheaper than the higher, washed grade formerly required by the Falstaff Breweries' natural draft stokers. When a new B&W Integral-Furnace Boiler, Type FF was installed in their St. Louis plant No. 5, Falstaff enjoyed an initial saving of 25% on fuel costs.

And that wasn't all . . . with the new B&W unit, they squeezed more efficiency from the cheaper fuel by increasing the rate of evaporation from 6.6 pounds of steam per pound of coal to 8.4 pounds . . . bringing fuel savings to a total of 45%!

Sudden load surges typical of brewery requirements are met with ease. Steam loads can be increased 15 to 20% within a matter of seconds without carryover or loss of pressure. Whatever your business, the use of B&W's 80 years experience in boiler improvement is sure to be appreciated by your plant engineers and cost accountants. The Babcock & Wilcox Co., 85 Liberty St., New York 6, N.Y.

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G-526

THE EDITOR'S PAGES

IT DON'T BOTHER US NONE AT ALL!

ONE OF HPAC's readers — chief plant engineer for a well-known confectionery company — sent us last week a swell suggestion for a series of "data sheets" which would be of value to his engineering staff in preparing layouts for various departments and processes. Needless to say, we're going to try to develop the material he suggests for publication in our pages.

The reason we mention it now, though, is that in his letter our reader expressed the hope that he was not presuming too much in making the suggestion. We of course wrote him immediately to thank him for the idea, and to tell him that suggestions like his are practically the editorial department's life's blood.

If there be any other readers of this magazine who might feel they would be presuming in any way by making a suggestion of any kind to HPAC's editorial (or any other) department, we hope you'll stop feeling that way right now. We *want* — very much — *any* suggestions that may occur to you (including your frank criticisms). And you may be sure we'll heed them to the best of our ability.

INDEX FOR 1951 TO BE AVAILABLE ON REQUEST

AN INDEX for HPAC's 1951 issues, Vol. 23, Nos. 1-12, including the Journal Section of the American Society of Heating and Ventilating Engineers, is being compiled and will be available soon to HPAC's subscribers on request. If you want a free copy, send a note or postcard to the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

We'll keep your request on file until the index has been printed, and will then mail a copy to you.

DIRECTORY SECTION APPEARS THIS MONTH

A COMPLETE Directory Section of Heating, Piping and Air Conditioning Equipment for Industrial, Commercial, Institutional and Public Buildings — thoroughly revised and brought up-to-date — appears for the 18th consecutive year in this month's issue of HPAC (see the yellow pages.)

Information on what will be available where during 1952 is carefully classified for your use throughout the year, along with complete street addresses and trade names.

The Directory Section is a plus feature of this issue, which also brings you the regular editorial content (including the Journal Section of the American Society of Heating and Ventilating Engineers.)

NPA PIPING COMMITTEE MEETS

BECAUSE OF THE shortage of seamless pipe, the Fabricated Metal Piping Industry Advisory Committee urged recently that steps be taken to induce customers to accept alternate specifications wherever this is possible.

The committee, at its first meeting with the National Production Authority, U. S. Department of Commerce, said alternate specifications would enable the fabricator and customer to agree on such materials as may be available for purchase, and would permit the use of welded pipe instead of seamless pipe, wherever possible, thereby easing the demands on seamless mills.

Government claimant agencies were urged by the committee to suggest that customers they represent as claimants rewrite specifications to include alternate materials when such materials can be used in accordance with codes on piping specifications.

NPA officials proposed that the industry study the possibility of scheduling production on order boards, similar to those set up under Order M-14, which covers scheduling of production of heavy power plant equipment.

Committee members reported that current shop production ranges between 60 and 70 percent of capacity. They said the main reason for this is the lack of proper sizes of pipe.

Members said that only 15 percent of the industry's production is for orders bearing the allotment symbols A, B, C and E. The percentage of production for maintenance, repair and operating supplies is practically negligible, while non-rated orders comprise a mere 5 percent of total business.

The committee's consensus was that inquiries about contracts are made cautiously and that numerous orders are being spurned because of the uncertainty of materials procurement.

A member pointed out that bored forgings for power plant piping require allotments of the full billet weight, which is often as much as six times the weight of the finished pipe. He said that inasmuch as such piping is generally alloy steel, efforts should be made to increase the availability of this type of material to the industry.

PIPE LINES ARE FASTEST-GROWING TRANSPORTATION

THE FASTEST GROWING transportation system lies underground. Pipe lines are increasing fabulously both in length and in size. In the five years 1946-1950, about 46,000 miles of trunk petroleum and gas line have been laid in the United States alone, and 12,000 more are in the construction or planning stage. As of 1950 the world had about 450,000 miles of pipe line (gathering and trunk), equal to 20 times around the earth.

Pipe diameters are increasing. The famous Big Inch (24 in.) line of World War II days is no longer the big line. One-half of a 550 mile crude oil line to be built to tap the West Texas field by the West Texas Gulf Pipe Line Co. will be 26 in. in diameter. Still larger is the Trans-

"QUOTE"

"Air purification is an engineering job. It never will be achieved by political expediency. It can only be accomplished by cleaning up plant after plant, by educating the management that dollars are being wasted when the plant smokes, and educating the boiler room personnel in proper methods of burning fuel."—*H. B. Lammers, Chairman, Coal Producers Committee for Smoke Abatement, at a meeting marking the committee's 10th anniversary.*

Arabian line built of 30 and 31 in. pipe (nesting one inside the other to save shipping space). An even larger pipe is the 34 in. natural gas line in California.

The various pipe lines abound with interesting new technical features, Westinghouse Electric Corp. says in a recent year-end review. The Gulf pipe line, for example, will feature the largest concentration of remote tank-farm pump and manifold valve controls thus far centralized on a control console. On one console will be the control of more than 100 valves and 11 pumps.

One of the most famous pipe lines, the 1261 mile products line of the Plantation Pipe Line Co. from Louisiana to North Carolina has been "double-tracked." The new line uses a novel way of measuring pressures. At the various pump locations pressures are measured by strain gages. The indications are amplified and transmitted as electrical signals to the control room. Previously this has beeen done by carrying the refined petroleum in small pipes to the console. While the constructions with this direct method of measurement have been designed with large safety factors, the presence of flammable products lines in the control room does introduce a hazard. Also the small-size pressure pipes sometimes corrode to the point of plugging up. The strain gage method is no cheaper, but does establish station conditions highly attractive to pipe line operators.

The men who are in the business of transporting gas and oil in pipe lines have taken a leaf from the book of those who transport kilowatts. This is the control of remote apparatus using supervisory control equipment. A booster pumping station and a main line valve of the Pan American pipe line in Texas will be controlled entirely by an operator in a station 40 and 80 miles away respectively. The supervisory control system is basically the same as used by electric power companies for years but the equipment has been modified to be in keeping with pipe line practice. Signals will be interchanged between the control and the controlled stations over a microwave system previously installed for communication purposes. The attendant at the master station will be able to operate all suction and discharge valves at the distant stations, can start and stop each of two pump motors, and can perform other necessary functions. The control also gives him, automatically, several indications of the state of affairs at the two unattended points, even including the presence of hazardous gas in the station buildings, and any abnormal pressures or bearing temperatures. Various pressures and motor currents are telemetered to him continuously. The supervisory control apparatus even checks itself and the circuit and, if it should become inoperative for any reason, it "says" so. To perform any of the desired operations by the supervisory apparatus, the operator presses buttons exactly as if the equipment were in the next room. All selection and checking of communication circuits is done automatically.

MOBILE COOLER SOLVES A PROBLEM

TECHNICAL PERSONNEL doing final assembly work on B-47s located on the ramp at the Boeing Airplane Co.'s Wichita division could not work because the heat of the summer sun created a temperature within the planes exceeding 130 F. In addition, engineering test pilots clothed in warm flying suits were subject to discomfort and loss of efficiency during the time required to warm up and adjust the engines and instruments.

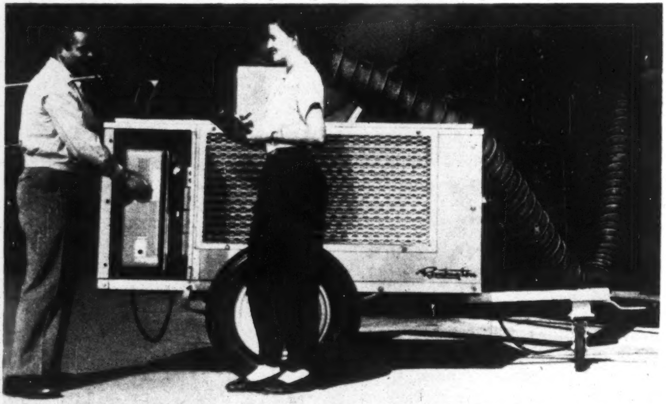
As a result, a mobile cooler was developed. It is an electrically driven, self contained air conditioner mounted on a standard 4 ft by 6 ft two wheel, ¾ ton trailer chassis. Under normal operating conditions the cooler has a rating of 39,000 Btu per hr. The entire unit looks like a large rectangular metal box, mounted on a trailer, with a "schnorkel" projecting from the top of the unit. A flexible duct 25 ft long is retractable into the "schnorkel" when not in use, connects the unit to the space to be cooled.

OVER $1 MILLION FOR IBR ACTIVITIES

MORE THAN 1 MILLION dollars have been invested in educational and promotional activities by members and associate members of the Institute of Boiler and Radiator Manufacturers since 1938, according to R. E. Ferry, general manager of the institute. Seventeen percent of the sum went for research, 30.3 percent for publicity and promotion, 5.7 percent for educational work with the trade and wholesalers, and 47.0 percent for operating the institute so that the engineering, research, promotional and educational activities may be conducted.

Mr. Ferry summarized the outstanding major achievements of the IBR as the development of a boiler rating code, the research program, the preparation and publication of six installation guides, the distribution of boiler operating instructions, the consumer advertising campaign, baseboard ratings, fin tube ratings, the work which has been done on an indirect water heater code, the short courses, and the "School of Modern Heating."

THIS UNIT has a capacity of 39,000 Btu per hr, can be used for various industrial and military applications in addition to the plane cooling problem for which it was developed (photo courtesy Remington Corp.)



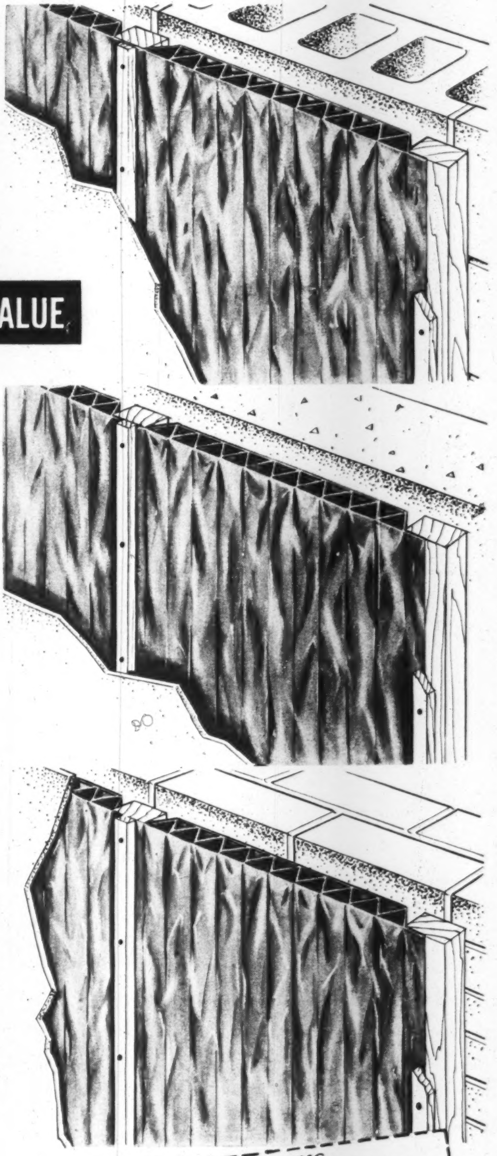
How to

INSULATE MASONRY WALLS

CREATE 1" WALL SPACE

GET 2" to 3" DRY INSULATION VALUE

At 12¢ a Square Foot*



Convert to active use—for playrooms, storage, laundries, workshops, even living-quarters—basements and other areas which have walls of brick, stone, cinder or cement blocks, or poured concrete.

Create comfortable *insulated* areas in factories, warehouses, piers, terminals, garages, etc.

This requires solving the twin problems of insulating against DAMPNESS and HEAT LOSS.

The solution: Install TWO or THREE aluminum sheets, spaced to create FOUR reflective air spaces. They are vapor-proof with ZERO permeability; non-condensation-forming; and waterproof.

The air spaces practically eliminate heat flow by CONDUCTION. The aluminum surfaces throw back 95% to 97% of heat RADIATION, and block heat flow by CONVECTION.

Pre-fabricated with tough, accordion aluminum sheets, and ONLY ONE-HALF INCH DEEP, this is commercially known as Type 4 Jr. Infra insulation.

INSTALLATION TECHNIQUE

On 16" centers, attach 1" furring strips to walls. Tack flange of Type 4 Jr. to FACE of furring with staples, flat surface facing room. Nail rough lattice strips over flanges. This prevents contact with wall and creates additional air space. Finally attach wallboard or lath for plaster.

*Cost of furring, lattice strips and Infra installed, 12¢ sq. ft.

TYPE 4 Jr. THERMAL FACTORS, IN 1" SPACE

Wall-Heat	**C.150, R 6.66**	**= $2\frac{3}{4}$" dry rockwool**
Down-Heat	**C.097, R 10.30**	**= $4\frac{1}{5}$" dry rockwool**
Up-Heat	**C.194, R 5.15**	**= $2\frac{1}{9}$" dry rockwool**

INFRA INSULATION, INC.

525 Broadway, New York, N. Y. — WORTH 4-2241

Write for
technique of
installing
Infra Type 4 Jr.
under floors.

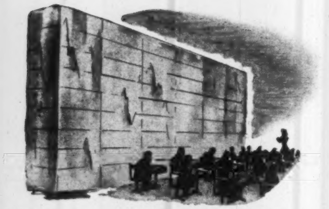
INFRA INSULATION, INC.
525 B'way, New York, N. Y. Dept. H-1
Please send Techniques for Installing Infra
Type 4 Jr.

Name ____________________

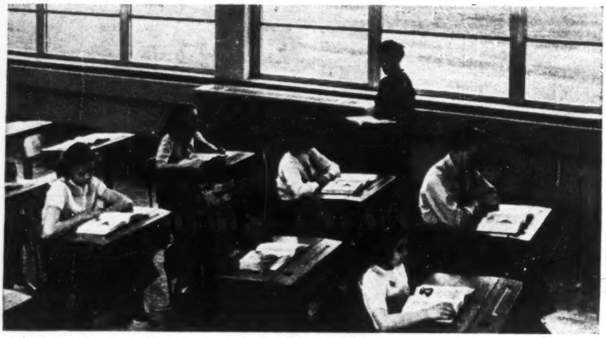
Firm ____________________

Address ____________________

☐ Send prices of Infra Insulations
☐ Send Sample

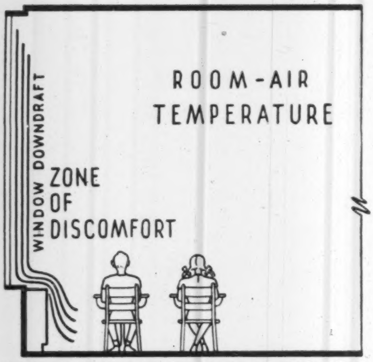


Will your system be ABLE to cope with the window "wall-of-ice" in the classroom?

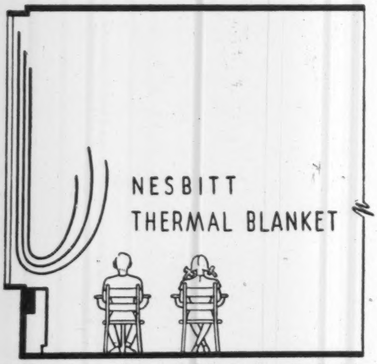


Showing the Nesbitt Syncretizer with Wind-o-line Radiation extending from both ends of the ventilating unit—positive protection against window downdraft.

How Comfort*able* will be your new SCHOOLROOM UNIT VENTILATING SYSTEM?



With room-air temperature evenly maintained, the downdraft from large windows on cold days may remain the robber of comfort for pupils.



Nesbitt Syncretizer and Wind-o-line Radiation temper the window downdraft, raise it out of the impression range, improve thermal balance.

If thermal comfort depended alone upon the classroom *air temperature*, your choice of ventilating units would be relatively easy . . .

but since you know that the *radiant temperature differential* of surrounding walls and surfaces is equally important in its effect on overall thermal comfort, you need to remember:

1. The basic cause of low surface temperatures in cold weather is the large window area in the modern classroom.
2. The sound solution to the chilling effect of the downdraft created by this "wall-of-ice" is to release *heat* over the surface.
3. In any classroom in which the window downdraft is not adequately protected by the unit ventilator alone, you need the *Nesbitt Syncretizer and Wind-o-line Radiation*.

Wind-o-line fin-and-tube radiation is installed to extend from both ends of the unit ventilator for the full length of the windows, at the sill line—and continued, if required, along cold outside walls. It is controlled in cycle with the Syncretizer to release a small quantity of heat—sufficient to temper and raise the downdraft and protect occupants by a "thermal blanket." Wind-o-line may be wall-hung in its own grilled casing, or recessed in a channel of the storage cabinets when such are to be integrated with the Nesbitt Syncretizer.

Send TODAY for Publication 264

NESBITT *Syncretizer* and Wind-o-line Radiation

The Nesbitt Syncretizer, Wind-o-line Radiation, and The Nesbitt Package are sold by John J. Nesbitt, Inc., Phila. 36, Pa., and by American Blower Corporation.

"OPEN FOR DISCUSSION"

WHAT IS A DRAFT?

I READ Thomas H. Urdahl's discussion of the word "draft" in the October issue with interest. I agree with him that there is a great deal of confusion in connection with the term. I took a few minutes to check the dictionary to find out what it had to say about the word "draft". I found about a dozen and a half definitions of the word. However, only one of them has any relationship to the air conditioning industry. That definition is that a draft is "a movement of air". The ASHVE Guide agrees with that particular definition. It does not seem that our purpose would be served by adding another definition to an already overworked word. It might be more logical that we coin a new word to fit Mr. Urdahl's definition.

It is very aggravating to the design engineer for a person to extol the benefits of an air conditioning system one day and then the next day, under the same conditions, complain bitterly about a "draft". The innocent air conditioning system producing identical conditions both days is blamed for bodily changes within the man himself. The "air movement" and air temperature being the same both days would logically create similar sensations. Obviously, there has been some change in the man's bodily reactions because the second day of exposure to the same draft produced a markedly different reaction. People who live in drafty houses ought to better understand their own physical makeup.

I have not helped the problem any with these comments, I fear. It is one problem that has caused many headaches and misunderstandings.—H. G. GREGERSON, Chief Mechanical Engineer, George L. Dahl, Architects & Engineers.

THE DISCUSSION of what a draft is becomes "draftier" with each issue. At the risk of becoming breezy, here is further comment on Mr. Gregerson's comment and in further support of my first comment in the October issue.

Misinterpretation of any definitive term through "loose" usage inevitably results in confusion. Hence these discussions of "draft". The definition of draft as applied to air movement in a stack or through space seemed to possess a sufficient elasticity to cover a "sensation of discomfort", as it is frequently expressed by Charles Leopold, well-known consulting engineer. The "elastic limit" of the definition of draft as applied to air movement has been exceeded to the point of requiring a new definition relating to comfort. In my comment in the October HPAC, a new definition is suggested as applied to environmental conditions. I do not think that a new word or term, as suggested by Mr. Gregerson, is needed nor indeed is desirable.

From a practical standpoint, the use of a new term would require much more education to develop its general usage than would re-education in the use of the term "draft" when applied to a sensation.—THOMAS H. URDAHL, Consulting Engineer.

COMBUSTION PRODUCTS AND FLY ASH

IN THE "OPEN FOR Discussion" columns of the November HPAC, L. C. Hardison and W. J. Parduhn of Illinois Institute of Technology replied to Lester S. Ries, of Oberlin College, when the latter commented on the tall 200 ft stack now used at Illinois Tech. May I add a few additional comments?

The reply, as given, states that "It is common knowledge that stacks for modern plants serve very little purpose other than that of getting combustion products up high enough to keep them from being objectionable".

While I am sure this was not the intent of the authors, is it not true that the obnoxious products of combustion (dust, etc.) are merely transferred to more distant points, and are not in any sense reduced or eliminated? Thus, some distant towns will be getting the benefit of the dust from this 200 ft stack instead of the area adjacent to the institute.

I believe it has been established that fly ash nuisance can be traced from a distance many miles away from the point of annoyance. Now, if everyone erected high stacks to get rid of their own nuisance, the effect would be, as I see it, for all of us to suffer from someone else's refuse.

Perhaps, in the case at hand, the precipitator that is installed makes Illinois Tech a good neighbor in spite of the purport of the high stack.

Some years ago, before induced draft was as widely used as today, a Columbia University engineering professor made the statement that "a tall stack is a monument to inefficiency". We believe this has been well demonstrated by the increasing practice in recent years to install induced draft on all kinds and types of boilers, from the small heating sizes to the largest of the utilities. Boiled down, the principal reason for this is that more precise and accurate control of the combustion can be obtained through mechanical draft, and the vagaries of the weather and its wide effect on chimney draft completely eliminated.

With the present high cost of fuel, the savings from precise control of the combustion make the capital investment for induced draft equipment a good dividend payer. Furthermore, in most (if not all) cases, mechanical draft equipment costs far less than a tall stack.—C. H. SMITH, Secretary, L. J. Wing Mfg. Co.

REPLY BY AUTHORS—Mr. Smith's comments indicate his thorough appreciation of the air pollution problem existing in this country today, and such criticism is, or should be,

HOW ABOUT expressing your views on one of the articles in this month's issue of HPAC, for publication in these pages? Your comments on a controversial point or additional information based on your experience would interest and help others. Or perhaps you'd like to say a little on some other matter of importance to plant engineers, building engineers, operating and maintenance men, heating, piping and air conditioning engineers or contractors? We follow here each month the practice at engineering society meetings of providing an "open for discussion" period. You are invited to participate. Please address the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2

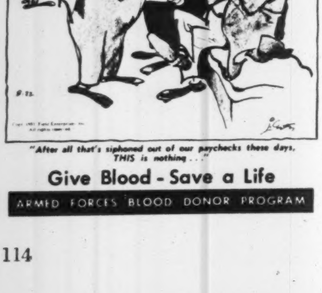
welcomed by any one responsible for the operation of a central heating plant.

Mr. Smith makes the point that fly ash is in no way diminished by the use of a tall chimney, which is certainly correct. However, the words "fly ash" and "combustion products" are not synonymous, and confusion of these two terms is often the basis of comments such as this one. "Combustion products," of course, refers to the large volume of hot CO, CO_2, N_2, SO_2, etc., *plus* fly ash which is passed through the chimney. For instance, our plant will discharge approximately 1 lb of fly ash for every 5000 lb of combustion gas. While the 1 lb of fly ash may eventually settle out of the air, the gaseous products (including both poisonous and highly corrosive constituents) will not. No practical method has been devised to render them harmless other than thorough dilution with fresh air.

The city of Chicago has set up regulations governing minimum chimney height on the basis of quantity of combustion gas produced, which is pretty nearly proportional to the boiler rating. Consequently, any 60,000 lb per hr plant built in Chicago today will have a "tall 200 ft 'monument to inefficiency'" serving it, regardless of whether it fires pulverized coal or saw mill wastes.

The fly ash problem is an entirely different one. Solids in the flue gas *can* be removed, either by electrical or mechanical means. The cyclone type precipitator used at Illinois Tech is guaranteed to be 90 to 98 percent efficient in removing solid particles down to 20 microns in diameter. The small amount of fly ash that gets past the precipitator might present a problem if it were allowed to fall within a radius of, say, 100 ft of the plant. The 200 ft stack does not allow this to happen. We do not feel that the plant passes enough fly ash to be objectionable outside of a radius of several miles.

GRIN AND BEAR IT By Lichty


RED CROSS BLOOD BANK
THE WOUNDED NEED YOUR BLOOD

"After all that's siphoned out of our paychecks these days, THIS is nothing . . ."

Give Blood - Save a Life

ARMED FORCES BLOOD DONOR PROGRAM

In short, the tall stack is neither an indication of inefficient operation or of inadequate fly ash separation. —L. C. HARDISON, Mechanical Engineer, and W. J. PARDUHN, Superintendent, Dept. of Buildings and Grounds, Illinois Institute of Technology.

ARE EFFECTIVE TEMPERATURES ACCURATE?

IN HIS REMARKS on page 89 of the December HPAC, referring to R. C. Jordan's earlier comments on effective temperatures, Thomas Bedford mentions the paper by Professor F. B. Rowley, Dr. W. E. Snyder, and Professor Jordan which was published in the ASHVE Journal Section of the June 1947 issue of Heating, Piping & Air Conditioning. This paper — together with the discussion on it — is now available in the ASHVE Transactions, vol. 53, page 357.

My portion of the discussion is too lengthy to be repeated here. In brief, I stated that I believed that a statistical analysis had been made from unsuitable data obtained with inadequate experimental apparatus and, furthermore, that the defects in the experimental procedure could have produced the apparent results even if the effective temperature lines are correct to the minutest detail.

My comment, if correct, is not a reflection on the work of Professor Rowley, Professor Jordan and Dr. Snyder, who were instructed to make the analysis from the available data. They have specifically denied responsibility for the accuracy of the data or its adequacy for such an analysis.—CHARLES S. LEOPOLD, Consulting Engineer.

DATA ON WELDED STEEL PIPE

IN HIS PAPER entitled *How to Space Supports for Large Diameter Thin Wall Pipe*, in the September HPAC, Theodore E. Bridge referred to a table appearing in the *Handbook of Welded Steel Pipe*, issued by the Calco Div. of Armco Drainage & Metal Products, Inc.

The information contained in this handbook is published for information purposes only and does not take the form of a recommendation. Recommendation is withheld by us in any given instance because, while the methods of calculation and allowable stresses conform with good engineering practice, there may be many instances where these stresses do not comply with code or insurance regulation requirements nor do they account for corrosion or erosion losses nor for other loads which installation or operating conditions may bring about.

As editor-in-chief of a new manual on steel pipe being prepared for the American Water Works Association, the writer would be pleased to obtain a copy of the paper under discussion as well as a copy of the previous article by Mr. Bridge, *How to Space Pipe Supports.*

It is the writer's opinion that Mr. Bridge's September article is a very fine one and is a nice contribution to aid the pipe line designer in solving a very common problem.—RUSSELL BARNARD, Advisory Engineer, Welded Pipe Sales, Armco Drainage & Metal Products, Inc.

WHY DOES PAINT PEEL FROM STACK?

IN REFERENCE TO the Question of the Month appearing in the October HPAC, "Why does paint peel from a steel flue stack?", I might venture a suggestion which may be of aid.

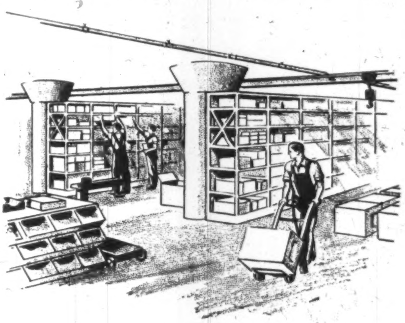
It would seem quite apparent that peeling or pitting of the surface coating of such a steel stack would be due mainly to oxidation taking place in and around the hairline cracks that are usually a result of expansion of the stack metal when the stack reaches a comparatively high temperature following the drying or setting of the paint.

Experience would indicate only one cure for such a condition, and that would be a liner applied to the interior of the stack. Such an application would serve two purposes. It would tend to preserve the interior metal surface of the stack against oxidation, and it would insulate it from the heat of the flue gases, thereby preventing undue expansion and contraction of the metal which tends to crack the exterior surface coating. —L. E. B.

BUSINESS IN MOTION

To our Colleagues in American Business . . .

The fact that a Revere Distributor is now celebrating its 125th anniversary year is an indication of the service the company has given its customers through those years. It is also another proof of the essential function performed by distributors for American industry. Most goods, whether industrial materials such as copper and copper alloys, aluminum alloys, iron and steel, or consumer articles such as refrigerators, radio and television receivers, kitchen utensils and ranges, go through the hands of distributors. Generally speaking, only the large buyers are in a position to purchase direct from manufacturers, who do not find it economical to handle the smaller orders. Yet those orders when pooled in the hands of an organization set up to handle them attain sizable totals, and hence a good distributor account is exceedingly attractive to a large manufacturer such as Revere.



A distributor serves not only the factories from which he buys. He also performs an invaluable service to his customers by making quickly available to them the products they require. A machine shop, for example, may need only a few hundred pounds of brass rod; there is a distributor within easy reach who can furnish it almost immediately. Or a contractor may want a few pieces of steel pipe and a thousand feet or so of copper water tube. Again, the distributor has them. A metal products distributor has to carry such items and an infinite number of others. The Revere Distributor who started in business 125 years ago actually has in stock 53,000 different items, cataloged, indexed, and held in warehouses ready for immediate shipment throughout its territory. Each month this stock is drawn upon by 5,000 to 8,000 customers, each order relatively small. There are many Revere Distributors with similar stocks and offering equal service.

To keep this distributor's warehouses filled with a balanced inventory, 18 people are required in his purchasing staff, which includes specialists in various kinds of materials, machines, tools and supplies. And to serve customers with information, quotations and the like, 25 salesmen are on the go constantly, calling on manufacturers, contractors, builders and stores throughout the busy industrial area in which the distributor operates. The large business done by the company is in great contrast to that of 125 years ago, when it was little more than a hardware store. The enterprise has grown in the American tradition of freedom to prosper in accordance with the principles of reliability and efficiency, fair dealing and integrity in performing a desired function.

Revere Distributors are selected for their ability to serve, and also chosen as to location, so that no matter where you are in this big country of ours, there is a Revere Distributor within easy reach. Today metal stocks may be short due to defense demands but manufacturers are doing everything possible to keep distributors supplied.

If you buy from distributors we suggest you remember that they are not only "central stockrooms," but have a great deal of special knowledge about the products they sell and can give you much helpful advice. Not only that, through the Revere Distributors you can be put in touch with the Revere Technical Advisory Service, which will cooperate with you on matters concerning the selection and fabrication of the Revere Metals. Our distributors, and those of every other manufacturer, render many essential services, both to those to whom they sell, and to those from whom they buy. The distributor system as it operates in the United States arose in response to the need for it. Today it fulfills that need more effectively than ever before.

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COPPER AND BRASS INCORPORATED
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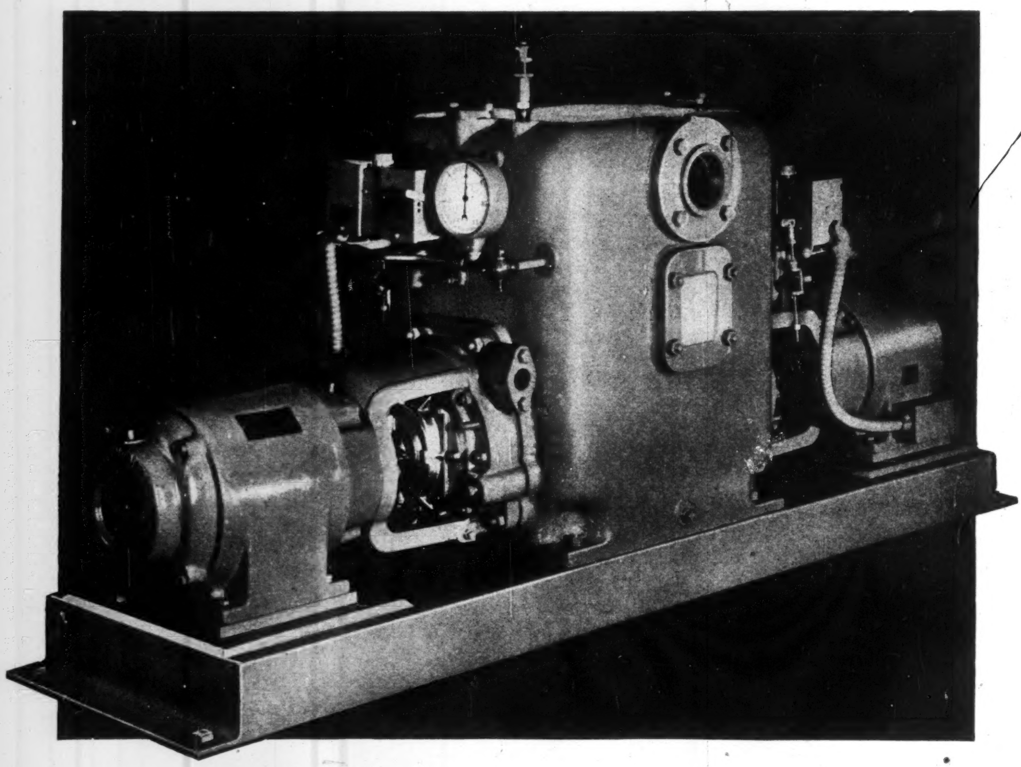

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THE NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

Let's Take Another Look at The Fuel Situation

Kalman Steiner, of C. Hoffberger Co., Baltimore (coal, fuel oil and burners, and ice), and a member of HPAC's board of consulting and contributing editors, has written widely on fuels and fuel burners from a background of much practical experience and careful study. In this article, he furnishes information to help answer the question: During a period of intensified military preparation, will the American fuel industry be able to supply all demands for fuel?

FACING THE LARGEST peacetime military preparation program in its history, our country's industrial effort depends upon a continuous and ever-increasing supply of fuels. More richly endowed by nature than most other countries with abundant and varied fuel resources, we have built up a fuel technology that presents many ramifications in engineering and economics.

A quick summary of the current fuel situation should be helpful in analyzing the broad implications in the present status of business and industry, and the probable course of events. Such a summary was presented in HPAC last January; this article will attempt to bring the discussion up-to-date.

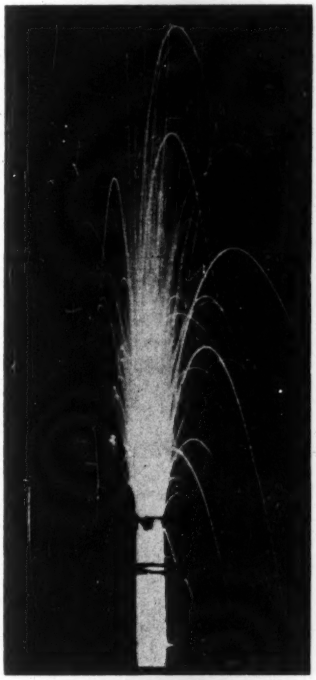
The diversity and significance of fuel engineering problems may be appreciated from a review of the 248 separate research projects in fuels and fuel utilization being conducted in American technical schools during 1949, date of the latest census of the subject. Their scope ranges over coal combustion, cleaning, handling, hydrogenation, pulverizing, processing, utilization and coke manufacture; oil prospecting, oil production, oil shale processing, petroleum coke, petroleum recovery; natural gas; peat. Even this list does not encompass all present-day aspects of fuel technology.

Since the outbreak of hostilities in Korea in mid-1950, production of most fuels has risen appreciably. For soft coal (bituminous and lignite), 1950 output exceeded 1949 by 17.9 percent, and up to November 1, production for 1951 was about 5 percent ahead of 1950. For anthracite, 1950 saw 3 percent more production than 1949, but up to November 1 production in 1951 lagged about 10 percent behind 1950, probably because of conversion of domestic heating plants to oil and natural gas.

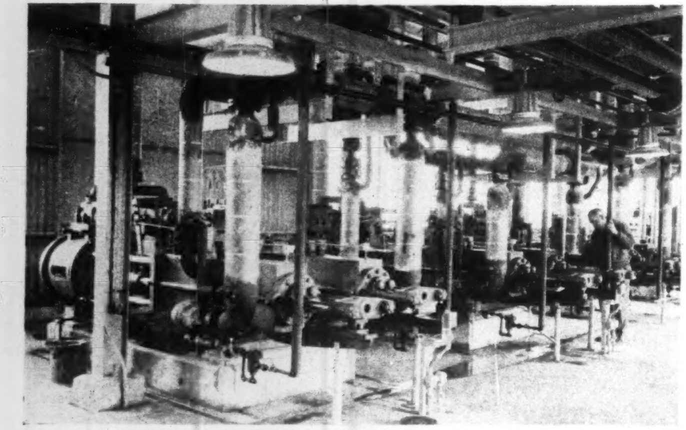
As to petroleum, the Bureau of Mines forecasts a total 1951 production of 2,446 million bbl (42 gal) against an actual 1950 production of 2,153.6 million bbl and a 1949 total of 1,999.2 million bbl.

Finally, natural gas in 1950 showed a 16 percent production increase over 1949, and the 12 months ending last September 30 showed natural gas sales by utilities 17 percent higher than the preceding year. Part of this natural gas replaced manufactured gas in certain areas, so that total gas sales were 15.3 percent ahead of the preceding year.

The forecasted petroleum produc-



STREAM OF BURNING GAS emerging from a borehole at the underground gasification project at Gorgas, Ala., creates a pyrotechnic display



STEAM-DRIVEN PUMPS in foreground discharge coal paste at 10,300 lb per sq in. pressure at the Bureau of Mines demonstration plant, Louisiana, Mo. Other pumps handle flushing oil, wash oil, and naphtha

tion for 1951 represents about a 300 percent increase over 1932. The natural gas production of 6.28 trillion cu ft compares to 2.89 trillion cu ft in 1941 — an even more startling rate of increase. But our principal fuel resource, soft coal, fails to show an increase. Since 1926, when we mined 573.4 million tons, only during the World War II era was greater production attained. The 516.3 million tons of 1950 was under that of 1917 (551.8 million tons). Anthracite consumption is dwindling rapidly — from a peak of 99.6 million tons in 1917 to approximately 40 million in 1951.

The latest published estimates (Senate Committee on Interior and Insular Affairs, January 15, 1951) reveal that coal represents about 87 percent of our ultimate recoverable mineral fuel resources. But whereas in 1917 soft coal contributed 70 percent of our total energy requirement, and anthracite 12.2 percent, only 36.4 percent came from soft coal and 3.4 percent from anthracite, in 1949. Petroleum and natural gas contributed 10.3 and 4.1 percent, respectively, in 1917, and 36.6 and 18.7 percent in 1949. The fact that we are continually increasing our consumption of liquid and gaseous fuel resources and diminishing our use of coal is cause for concern to those who check into the long-range aspects of the national economy, and has raised much controversy as to a national fuels policy.

Synthetic Fuels Are Controversial

In my January 1951 article in HPAC I reviewed the accomplishments in the technology of synthetic fuels, and showed that the Bureau of Mines in its three demonstration plants (two for coal-to-oil conversion and one for shale oil) has produced synthetic liquid fuels on a basis approaching the economy of petroleum refining. On May 19, 1951, the Secretary of the Interior, Oscar L. Chapman, announced that private interests were ready to proceed with a commercial venture for making synthetic liquid fuels from coal, the investment in plant to approximate $400 million, given a minimum of governmental assistance — probably in the form of agreements to purchase plant output, if necessary, at a specified price and for a limited time. He pointed out that such plants were needed as long-run measures to assure economical supplies of vital materials. He added that shale oil might be our best insurance for quick expansion to overcome some unexpected gasoline supply emergency.

Opposition to the proposed plant immediately arose. The petroleum industry takes the stand that it can provide the country's requirement for liquid fuels, and that steel during a period of tight supply would be better utilized if allocated to expansion of petroleum refining capacity than to construction of a synthetic plant. Other opposition was based on the thought of governmental subsidy of the proposed plant. In rebuttal, the Interior department asserts that less steel will go into a synthetic plant than required for the petroleum industry to produce and refine additional crude to yield the equivalent finished product.

The controversy jogs along. The Defense Production Administration has not yet made a decision on the large plant, nor on a small shale plant for producing a thousand barrels a day. The National Petroleum Council on October 31 asserted that production of synthetic liquid fuel from coal is uneconomical. The following day Defense Solid Fuels Administrator Charles W. Connor said that a sound conservation policy must take cognizance of and benefit by conversion of coal to liquid fuels. Secretary Chapman on November 7 informed the annual meeting of the American Petroleum Institute that he means "to advance the development of (synthetic) liquid fuels . . . by any and all feasible, reasonable, sensible means consistent with national laws, national interests, and national policy." He has recently appointed a firm of consultants to make an independent analysis of the costs of making synthetic liquid fuels by present methods. C. E. Davis, director of the refining division of the Petroleum Administration for Defense, at the annual meeting of the American Society of Mechanical Engineers on November 27, predicted that the pace of research in development of synthetic liquid fuels will grow rather than diminish, but objected to subsidization. He added that there is also need for further pilot plant and semi-commercial development to obtain the greatest possible scientific knowledge and know-how.

Meanwhile, a small private industry synthetics plant has been erected in West Virginia, as a coal hydrogenation pilot plant, at a cost of about $11 million. A very significant factor in the decision to erect the plant at this time is the supply of vital chemicals that will derive as byproducts: pitch coke, naphthalene, solvent naphtha, coal tars, tar acids, special carbon, light oils, benzene and toluene. All are important materials in chemical industry. The country's only other private synthetic liquid fuel plant, in Texas, is gradually getting into production of gasoline made from natural gas.

Other Opportunities for Coal Conversion

Fuel technology offers other possibilities for utilization of coal by conversion to a more convenient form. Natural gas distribution and consumption threaten to outrun the supply. On October 17 it was proposed by F. O. Hess, the retiring president of the Gas Appliance Manufacturers Association, that a system of coal-to-gas conversion plants be erected to supplement both the supply of gas and the limited capacity of gas pipe lines feeding the east and north. Included in his proposal would be facilities for making synthetic liquid fuels and strategic chemicals. He urged the cooperative effort of experts in gas making, coal hydrogenation, chemistry, coal mining and the oil industry.

The Bureau of Mines continues developing its program of underground coal gasification investigations at Gorgas, Ala. One new technique is the electrolinking of bore holes at some distance apart, eliminating costly tunnelling. Passage of an electric current raises the temperature of the intervening coal seam, causing distillation of gases and rendering the seam porous for the passage of the gasifying medium — air, air and oxygen, oxygen and steam, or oxygen with air and steam. One objective is the production of synthesis gas for subsequent conversion to liquid fuels. Another is providing a fuel for gas turbines or boilers for generating low cost electric power. A third possibility is manufacture of ammonia. It is hoped to produce a gas of 80 to 100 Btu per cu ft heating value when using air continuously as the gasifying medium.

Hydraulic Transportation of Coal

A recent Bureau of Mines publication (RI 4799) deals with hydraulic transportation of coal, and summarizes work and literature in this field since 1895. In the opinion of pump manufacturers, equipment can be built to handle a coal-water mixture ranging between 25 and 40 percent coal. A considerable amount of fines would be desirable because of the lubricating action of fines in reducing power requirements. Suitable dispersing agents keep the fines in suspension, even overnight and through weekend shutdowns.

Other manufacturers report investigation into coal pumping. Top sizes of 2 to 3 in., critical velocities of 7 to 9 fps in an 8 in. ID pipe; 3/16 in. top size at 5 fps critical velocity in a 3 in. line, represent the thinking of one manufacturer. A recent estimate places the probable cost of transporting coal hydraulically on a basis of 500 tons per hr, 8 hr per day, at 2.4c per ton-mile, or on a 24 hr basis, 1.8c per ton-mile. Subsequent to completion of the Bureau of Mines survey, the Pittsburgh Consolidation Coal Co. has announced plans to build a full-scale demonstration 12 in. pipe line near Cadiz, Ohio, 17,000 ft long.

Lignite Fuel System Being Developed

Perhaps the most important recent announcement in utilization of solid fuels is the projected lignite fuel system developed by the Bureau of Mines for the plant now under erection in Milam County, Texas, by the Aluminum Co. of America, for smelting aluminum. The proposed plant capacity is reported to be 85,000 tons of aluminum annually, and initial production is scheduled for the fall of 1953. The plant's enormous electric power requirement will be provided by steam driven generators, the steam boilers to be fired with a charred lignite. The Bureau of Mines and the Texas Power and Light Co. have jointly worked out the process, which will call for a battery of twelve 575 ton per day lignite processing units. From nearly 7000 tons per day of lignite, the system will make 3200 tons of char.

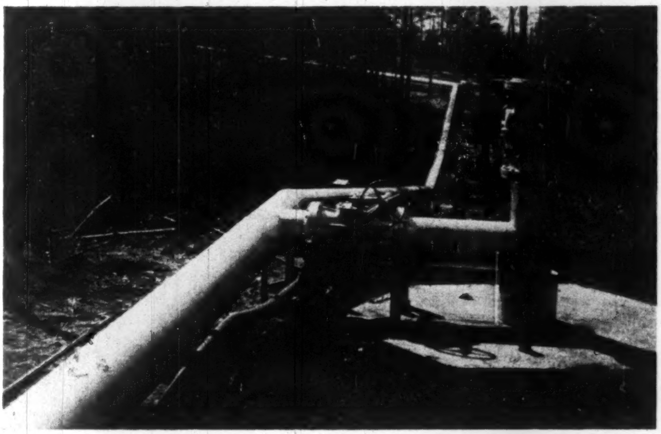
Raw lignite, containing 35 percent moisture and having a heating value of 7000 Btu per lb, when retorted yields a char having a heating value of 10,600 Btu per lb. The char represents only 45 percent of the original weight of the lignite, but contains 75 percent of the heating value. The process works not only with lignite, but also with low rank western coals. The more favorable coals of this region will yield about 50 gal of tar per ton, valued at 8 to 10c per gal, making the tar itself worth the original cost of the coal. Lignite from Milam county yields about 14 gal per ton.

In addition to char fuel and tar, the process is expected to provide about 40 percent of the carbon electrode needed in the smelting of aluminum. The tar itself is wanted now chiefly for its value as a creosote preservative for wood, but of course it can be refined in any by-products plant to yield a multitude of valuable chemicals.

Making Synthetic Oil from Shale

In the manufacture of synthetic oil from shale at its Colorado demonstration plant, the Bureau of Mines has had satisfactory performance from a gas combustion retort —

A 20 IN. AIR MANIFOLD at the second underground gasification project, Gorgas, Ala.



which is a self contained unit, producing its own fuel, requiring no cooling water and operating with a minimum of power expenditure. In addition, the retort is simple in construction. Crushed raw shale enters the top through a gas seal and flows through the retort by gravity. About midway in its downward passage, the shale is heated to the retorting temperature by hot combustion gases generated by burning recycle gas, air being injected. Spent shale leaves the retort through a gas seal, the rate being controlled by a rotating disc feeder at the retort bottom.

Cold product gas is introduced at the bottom and travels upward through a heat exchange zone, where it is heated by the descending spent shale, which itself is cooled. The preheated gas stream flows through a mixing chamber where it is mixed with air and then into the combustion zone, where the combustibles of the gas and some of the organic matter remaining in the retorted shale are burned. The hot combustion gases sweep upward, heating the shale and causing conversion of the kerogen, or formation of the oil from the shale organic matter. Continuing upward, the gases carry the oil vapor and the shale gas generated in the retorting zone through the product cooling zone, where the oil vapors are condensed by the cold, incoming raw shale.

The moving gases then leave the retort, are repressured by a blower, enter a centrifugal separator where the bulk of the oil is removed, then pass through an electrostatic precipitator that gleans the final traces of oil from the gas stream. Part of the gas from the precipitator is recycled to the retort and the remainder stored.

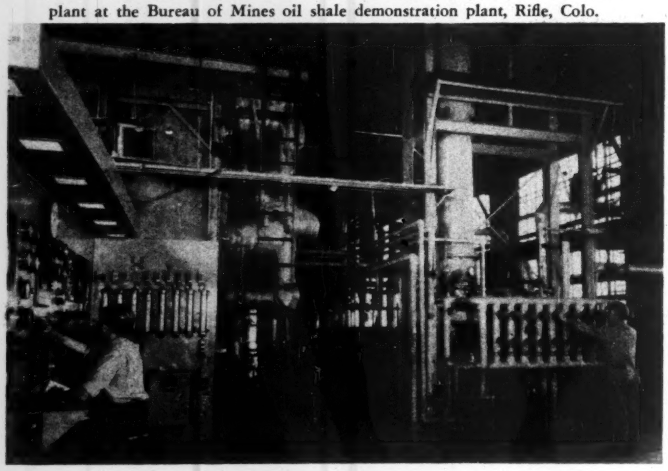
Thus, the input to the system consists of raw shale, air and electric power; the output consists of shale oil, gas and spent shale. In a region where water is not abundant, it is significant that this retort requires none for cooling or process.

Petroleum Industry in Better Position

In the highly complex petroleum industry, certain generalizations manifest themselves. At the end of 1951, the industry held a much better position than a year earlier — stocks in storage, rate of crude production, refining capacity, and transportation facilities all showed an improvement.

It was generally agreed that there was no likelihood of oil rationing during the current heating season. The Benton subcommittee on fuels of the Senate Small Business Committee, investigating adequacy of fuel supplies during the current winter for New England, reported in its preliminary statements that the situation was much better than the year previous. Steel allocations for the first quarter of 1952 seem to favor petroleum transportation facilities over gas transmission and distribution. Fuel oil supplies for uninterrupted steel production were also proclaimed adequate. The Petroleum Administration for Defense also indicated that the full impact of military demand upon civilian supply of petroleum products has already been felt and that no further curtailment of the civilian supply for the benefit of the military seemed imminent.

DATA ON RETORTING of oil shale are obtained at this gas flow pilot plant at the Bureau of Mines oil shale demonstration plant, Rifle, Colo.



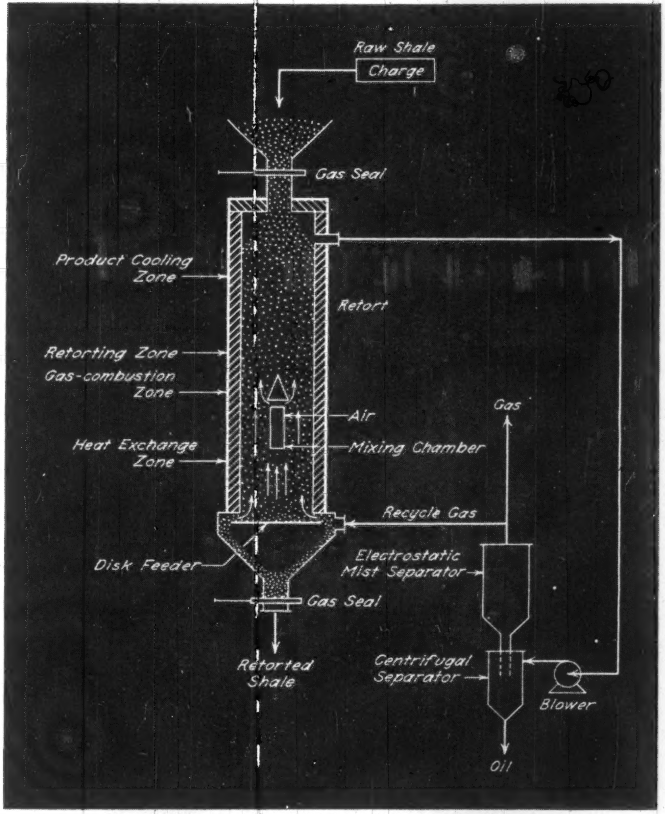
Dieselization of railroading continued through 1951: diesel power accounted for 53.1 percent of the ton-miles of freight hauled, for 63.7 percent of passenger train miles, and for 68.9 percent of locomotive hours for switching. Nineteen Class I railroads now own no steam locomotives, and only nine carriers (Norfolk and Western and eight smaller lines) are still exclusively on steam. The shift to diesels helps out on the somewhat tight supply of residual fuel oil, because a number of roads had previously used oil-burning steam locomotives which of course burn residual oil.

Further aid came in the form of a slight shift of utility generating stations toward coal and natural gas to release more residuals for smaller industrial plants and commercial heating fuel.

Because of the strain being placed on natural gas supplies, and because of the need to conserve the available supply for such vital uses as military armorplate production, the Petroleum Administration for Defense issued a curtailment order limiting the extension of natural gas for new customers, early in the fall of 1951. Provision is made in the curtailment order for states to remove themselves from jurisdiction thereof.

LP Gases Gain in Use

Liquefied petroleum gases (LP gas) gained considerably in usage since 1949. Statistics show that during the first half of 1951 alone, some 30,000 tractors converted to this fuel. The Phillips Petroleum Co. estimates that upward of 100,000 tractors now use LP gas, representing an important summer market by farm vehicles to offset drop in consumption by winter users. The 1950 total sales of LP gas came to 3.48 billion gallons, compared to 2.83 billion in 1949 and 1.27 billion in 1945. The designation "liquefied petroleum gas" can apply to straight butane, straight propane, or a mix-



GAS COMBUSTION RETORT —pilot plant flow diagram.

ture of the two, all derived as by-products in petroleum refining and all sold in steel vessels under pressure to keep the hydrocarbons liquid until released through a regulating valve. Other uses include domestic bottled gas, chemical industries, synthetic rubber, and enrichment of manufactured gas.

Effect of Iran Situation

Many persons wonder about the effect of the shutdown of the Abadan refinery in Iran upon world supply. Iran had been producing about ½ million barrels daily, or approximately 5 percent of the total world supply. During the latter part of 1951, much of this lost volume was provided by American refineries, who exported petroleum products to the markets formerly supplied by Iran. But other parts of the world are now taking care of much of the former Iranian markets, relieving American producers. Some authorities feel that it is only a question of time until some sort of compromise will be reached to allow Iranian oil again to reach world markets.

[The author wishes to extend his thanks for cooperation in the preparation of this article to Dr. W. C. Schroeder, Chief, and J. D. Doherty, Acting Chief, Synthetic Liquid Fuels Branch, U. S. Bureau of Mines. Photographs also are by courtesy of the Bureau of Mines.]

USES OF AIR CONDITIONERS GROW

OVER 70 PERCENT of the room air conditioners sold in 1951 were purchased by individuals for use in residences and apartments, said William B. Henderson, executive vice president of the Air Conditioning and Refrigerating Machinery Association, in an address at New Orleans last month.

He stated that while the majority were bought for greater comfort in sleeping rooms, many were purchased primarily as a warm weather aid for members of the family suffering from heart trouble, hay fever and other ills.

Speaking to the packaged air conditioner conference held during the American Society of Refrigerating Engineers' annual meeting, Mr. Henderson outlined also the wide use of packaged air conditioners by industry for the processing of many products and in research and development laboratories. Each year an increasing number of the more than two million stores, restaurants, display rooms and other establishments of the retail and service industries throughout the nation are being air conditioned as a matter of necessity for profitable operation, he said.

"The armed services of the United States are also large users of air conditioning", he added, "not only for the production and protection of essential equipment but also for the safety, health and morale of service personnel."

More and more business organizations are installing air conditioning primarily to provide more comfortable and healthful working environment for employees. Companies find employees are more productive, with much less absenteeism and dissatisfaction, when the working spaces are properly air conditioned, Mr. Henderson said.

Mr. Henderson gave the following figures on packaged air conditioning shipments for the years 1938 through 1950. The room air conditioner is the smaller in size and is of the windowsill or floor (console) type. Its size range is from 1/3 hp through 1½ hp. Usually it is air-cooled. The self-contained air conditioner is usually water-cooled and its size range is much broader, currently from 2 hp through 25 hp.

Packaged Air Conditioner Shipments
1938 Through 1950

Year	Room Air Conditioners	Self-Contained Air Conditioners
1950	193,807	56,047
1949	89,320	34,389
1948	73,638	37,982
1947	42,904	32,072
1946	29,835	17,829
1945	1,126	13,847
1944	523	4,468
1943	3,676	3,949
1942	21,561	3,079
1941	33,013	7,007
1940	11,444	5,880
1939	8,800	3,681
1938	13,350*	*

*No statistical separation made.

Note: Estimates of 1951 room air conditioner manufacturers' shipments are 238,450 windowsill and 12,550 console (floor) type units.

How to Compute Thermal Soil Conductivities

The mechanics of computing according to a theory developed by the author are briefly presented, and two examples show the step-by-step calculation. The computed values agree reasonably well with measured ones.

By Andrew Gemant
Staff Physicist, Research Dept.
The Detroit Edison Co.

THE THERMAL CONDUCTIVITY of soils is an important factor in many industrial installations in the ground — pipe grids for heat pumps, underground high voltage cables, steam lines and oil pipe lines, for example. The transfer of heat between these installations and the earth is controlled chiefly by the thermal conductivity of the latter. A knowledge of this characteristic is essential both in design and in operation.

There are three possibilities of obtaining numerical data for soil conductivity. One is by measurement, for which many well-known methods exist. The second is the use of certain established standard values, a procedure often employed in the operation of high voltage cables. A third is the calculation of the conductivity from the characteristics of the soil.

The author (among others) has developed a simple theory [1,2] that permits this calculation to be carried out. The purpose of this article is to present the plain mechanics of such computation. The theory is not presented, but is given in the papers listed as references.

The dry density, moisture content, composition and temperature of the soil are of importance in this connection. The dry density s is expressed in lb per cu ft, and the moisture content w in percent of water in terms of dry weight. The composition p may be expressed as percent of clay in a mixture of clay and sand.

Equations for Soil Conductivity

In the formula for the thermal conductivity k (in Btu per hr per sq ft per F per in.), two other quantities, a and h, are used which are related to s and w by means of Equations 1 and 2.

In Equation 2, h_0 is a function of temperature and can be read from Fig. 1.

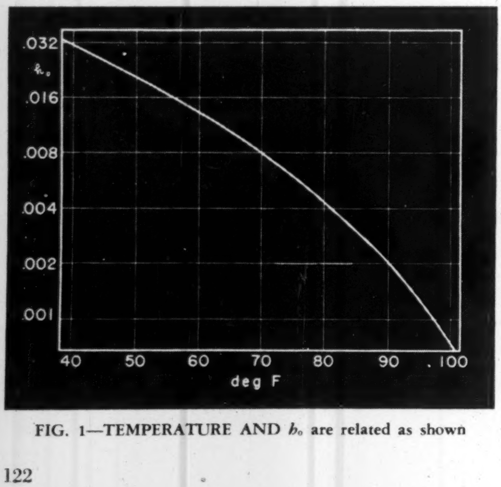


FIG. 1—TEMPERATURE AND h_0 are related as shown

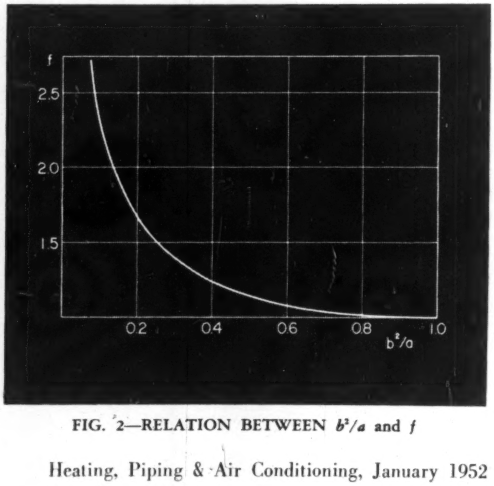


FIG. 2—RELATION BETWEEN b^2/a and f

Having obtained a and h in this manner, two further quantities, z and b^2 are obtained from Equations 3 and 4.

Finally, a quantity f is read from Fig. 2, where it is plotted as a function of (b^2/a).

As for the composition, characterized by p, it enters the formula by a quantity k_s which is related to p by means of Equation 5.

The thermal resistivity r, which is the reciprocal of k, is then given as a sum of two terms (Equation 6). The first of these two terms, r_1, is given by Equation 7. The second, r_2, is given by Equation 8.

The calculation, as outlined, is quite simple and can be carried out in a short time.

Examples Show Good Agreement

Two numerical examples will now be presented to illustrate the computational method. They refer to actual soils, the conductivity of which was measured, and it will be seen that the calculated and measured values are in reasonably good agreement.

One of the soils was pure clay. Its dry density was 70 lb per cu ft, and its moisture content 30 percent. The conductivity at 50 F, as measured by Smith and Yamauchi[3], was 5.95 Btu per hr per sq ft per F per in.

The computed value is arrived at in the following step-by-step method. First a is calculated from Equation 1; it is 0.65. Then h_0 is read from Fig. 1; it is 0.02. From Equation 2, the value 0.315 is obtained for h. Next, $z = 0.355$ from Equation 3, and $b^2 = 0.443$ from Equation 4. The quantity f, corresponding to $b^2/a = 0.68$, is read from Fig. 2; it is 1.04. Finally, $k_s = 17.5$ from Equation 5 with $p = 100$.

With these data, $r_1 = 0.117$ from Equation 7 and $r_2 = 0.059$ from Equation 8, yielding $r = 0.176$ from Equation 6. The reciprocal of this, 5.7, is the computed conductivity — which agrees well with the measured figure.

In contrast to this case, a soil containing 97 percent sand and only 3 percent clay will now be considered. Its density was 107, its moisture content 11, and its conductivity at 40 F (measured by Kersten[4]) was 14.8. Carrying out the computation in the same manner as before, the value 15 is obtained for the conductivity.

EQUATIONS

$$a = 0.078 s^{\frac{1}{2}} \quad \text{[1]}$$

$$h = 0.16 \times 10^{-3} sw - h_0 \quad \text{[2]}$$

$$z = \left(\frac{1-a}{a}\right)^{\frac{2}{3}} \left(\frac{h}{2}\right)^{\frac{1}{3}} \quad \text{[3]}$$

$$b^2 = \left(\frac{a}{1-a}\right)^{\frac{2}{3}} \left(\frac{h}{2}\right)^{\frac{2}{3}} \quad \text{[4]}$$

$$k_s = 40.5 - 0.23p \quad \text{[5]}$$

$$r = r_1 + r_2 \quad \text{[6]}$$

$$r_1 = \frac{[(1-a)/a]^{\frac{2}{3}} \tan^{-1}[(k_s-4)/4]^{\frac{1}{2}}}{(h/2)^{\frac{1}{3}}[4(k_s-4)]^{\frac{1}{2}}} \quad \text{[7]}$$

$$r_2 = \frac{(1-z)f}{k_s a} \quad \text{[8]}$$

SYMBOLS

k = thermal conductivity, Btu per hr per sq ft per F per in.

p = percent of clay in mixture of clay and sand.

s = dry density, lb per cu ft.

w = percent of water in terms of dry weight.

h_0 is a function of temperature — see Fig. 1.

f is a function of (b^2/a) — see Fig. 2.

r is thermal resistivity (the reciprocal of k).

EQUATIONS USED BY the author for computing thermal conductivities of soils and which are explained in the text

It must be pointed out that the good agreement in this case is rather fortuitous; deviations of from 10 to 20 percent between measured and calculated data are not infrequent.

The effect on conductivty of the various determining factors are reproduced correctly by the equations. Concerning the two examples quoted, it is interesting to note that the sand has a higher conductivity than the clay in spite of the facts that the clay has a higher moisture content and that moisture increases the conductivity. This is explained by the inherently higher conductivity of quartz, the basic constituent of sand, as compared with aluminum silicate, the basic constituent of clay.

It may be added that in high voltage cable practice a standard value of soil thermal resistivity — namely, 80 thermal ohms — is used. This corresponds to 8.7 Btu per hr per sq ft per F per in., a value lying between the two discussed.

Bibliography on Soil Conductivity

[1] The Thermal Conductivity of Soils, by Andrew Gemant, (*J. Applied Physics*, vol. 21, 1950, pp. 750-52).

[2] Die Warmeleitfahigkeit des Bodens, by Andrew Gemant, (*Arch. d. elektr. Ubertragung*, vol. 5, 1951, in print).

[3] Thermal Conductivity of Soils for Design of Heat Pump Installations, by George S. Smith and Thomas Yamauchi. (*ASHVE Journal Section, Heating, Piping & Air Conditioning*, July 1950, pp. 129-35).

[4] Thermal Properties of Soils, by M. S. Kersten. (*Univ. of Minnesota, Eng. Exp. Station Bull.* No. 28, 1949).

Cooling Tower Design for Air Conditioning Service

Raymond C. Kelly points out that a number of considerations become increasingly important as heat load requirements call for larger cooling towers. He gives design and construction details for four recent installations in four different cities to show some of the ways that today's cooling towers are meeting the requirements of air conditioning service

LONG-RANGE PLANNING by architects, engineers, consultants and contractors may well be influenced by any one or more of the cooling tower design considerations involved in four recent installations for air conditioning service. Years before the present widespread demand for large induced draft cooling towers became apparent, tower manufacturers began laboratory work and field experiments to develop equipment capable of dissipating to the atmosphere large quantities of "rejected" heat without creating a neighborhood nuisance or an unsightly structure. Many problems have been solved by improved designs. Others have been answered by intelligent planning during preliminary layout studies in which tower size, shape and function are considered collaterally with the site, the tower's position and adjoining premises. New devices and new materials have been combined successfully to answer earlier objections.

In metropolitan areas particularly, it seems apparent that air conditioned space brings higher rental fees to building owners, more trade to retail merchandisers, greater production per man-hour to employers and less personnel turnover to management. Each new system installed means a greater demand load on existing water facilities or the requirement for an economical device for the ultimate dissipation of the rejected heat to the atmosphere. Water conservation considerations virtually dictate the use of a cooling tower for this function.

Although the cooling tower industry is relatively young (and still has growing pains) basic structural designs are reasonably standard. Thermal capacities (roughly defined as the function of efficiently dissipating heat to the surrounding atmosphere at low-level temperatures related to the ambient wet bulb temperature) are relatively uniform for any given *net effective cubic volume of tower* (that space in which the air is in intimate contact with the water). Foundations, basins, piping, controls and operating procedures seldom present more than ordinary engineering problems. Mechanical components of towers — the fans, drive shafts, gears, motors, fan supports and fan throats — are being improved continuously and no longer represent the maintenance and repair problems experienced in the early days of induced draft tower operation. The materials of construction used — including steel, redwood, asbestos cement, copper, brass, bronze, cast iron, cast steel, malleable iron, aluminum, stainless steel, monel metal, galvanized steel and plastics — are fully qualified for their specific applications.

Proper selection of tower proportions, temperature levels, materials of construction and tower location is made by thorough study of the available space, thermal efficiency of the refrigerating equipment and effect of corrosive atmospheres, with an eye on the local building code and governmental regulations on use of water and sewer facilities.

Larger Towers Stress Other Problems

Other considerations — less well defined by experience or precedent — become increasingly important as heat load requirements call for larger towers for greater thermal duty. In the same instance, operating requirements demand freedom from objectionable noise, damaging ice accumulation, fogging, condensate formation, drift nuisance and vibration. These considerations present no insurmountable problems. But in a single tower the many considerations may bring complications — algae formation encouraged by sun exposure, bacteria growth abetted by cer-

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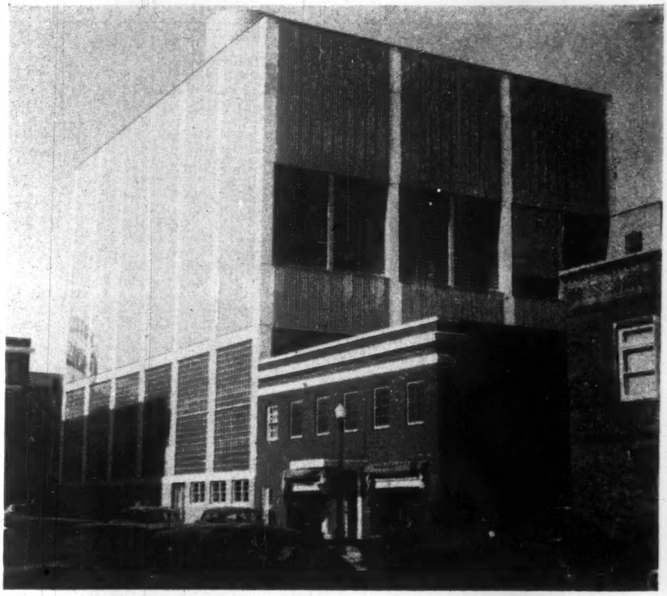
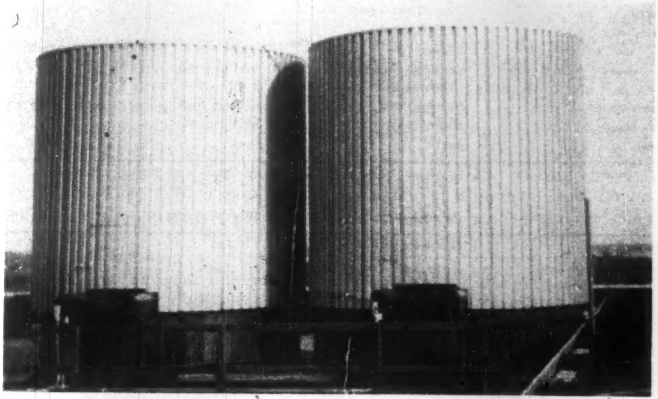
tain combinations of temperature, humidity and air pollution and, under other conditions, fungi growth encouraged by sun shading, moisture and temperature levels.

With this combination of design considerations (sound, ice, fog, condensate and drift) qualified for interference with such basic factors as air movement, recirculation, saturation of the exit air, dispersion of water vapor and loss of water due to entrainment in the effluent vapor (driftage), a comprehensive analysis is necessary to ascertain the net effect on overall thermal efficiency, architectural appearance, fire hazards and personnel safety. All components of the tower design should then be checked against the normal requirements of operating flexibility, mechanical reliability, ease of maintenance, insurance risk acceptability, building code conformity, structural stability and freedom from galvanic action between dissimiliar metals or the deteriorating effects of incompatible materials.

Complete treatment of each consideration would be prodigious. Sound control and mechanical vibration transmission deserves specific study by experts. The subjects of ice, fog, condensate and driftage logically belong in the engineering department of the cooling tower manufacturer. To the water treating chemists go the studies of algae, bacteria and fungi control along with the prescriptions for pH treatment to prevent excessive concentrations of dissolved solids and soluble salts. Into the joint conference of manufacturer and user go the basic considerations of thermal capacity, mechanical reliability, architectural treatment, operating flexibility and maintenance facility. To the chemists and designers go the studies of material compatibility, structural stability and conformance with building code requirements and local water conservation regulations. Of importance to all concerned are the subjects of fire hazard, insurability and personnel safety.



THE ROCHESTER TOWER[a] rises 100 ft above street level, is acoustically treated for sound control, thermally treated to offset sun exposure, and architecturally treated for pleasing appearance. Air flow control (and anti-icing) is effected by rollaway doors over air intake louvers. All-aluminum exterior minimizes maintenance expense. Dissimilar metals are electrically insulated



CONSTRUCTION PHOTO of Rochester tower showing redwood stave, aluminum clad fan stacks 13 ft in diameter and 16 ft high, sound insulated and architecturally treated. Fans draw fresh ventilating air into vertical gearhead[1] fan drive through rubber insulated tubular steel fan supports. Access door through throat provides servicing facility for inspection of fan assembly without shutdown

Four Recent Installations Show Solutions

In the selection of designs for four large induced draft cooling towers recently installed for comfort air conditioning duty in four different metropolitan areas, critical consideration was given each element of structural and mechanical design. Each installation had its unique requirements. The differences in basic design dictated by experience, coupled with sound analytical reasoning, become more evident in tabular form (Table 1). Selection of materials of construction likewise represented the consolidated opinions of the architects, engineers, contrac-

TABLE 1 — STRUCTURAL AND MECHANICAL design selections for four cooling towers

	Rochester, Minn.	Chicago	Pittsburgh	New York City
Sound control	Insulated walls, elevated location, high fan stacks, integral vertical gearhead fan drives[1], 8-bladed fans, rubber mounted fan supports.	Slow speed fans, integral vertical gearhead fan drives[1], high tower frame. Rubber mounted fan supports.	None required	**Complete sound control devices**[2] on air inlet louvers and fan stacks. Slow speed fans. Rubber mounted fan supports.
Ice formation	Adjustable louver[3] of aluminum (overhead rolling door type), high velocity vapor discharge.	None required	None required	None required
Fog dissipation	High fan stacks, high velocity vapor discharge.	None required	None required	Diluent air devices[4] in discharge vapor stream.
Condensate control	High tower frame, high fan stacks, high velocity vapor discharge.	High tower frame	None required	Elevated location, fan throat baffling.
Drift elimination	Special five-pass double section panels.	Tight flat-batt triple effect.	Standard triple effect angle-batt type.	Standard triple effect flat and angle batt type.
Thermal capacity[5]	180,000,000	48,000,000	38,240,000	60,000,000
Mechanical	Integral vertical gearhead fan drives.[1]	Integral vertical gearhead fan drives.[1]	Special worm gear fan drives.	Special worm gear fan drives.
Architectural treatment	Extruded and rolled aluminum (ribbed) panels.	Zinc-coated ribbed steel panels.	Masonry	Cement board sheathing, stainless steel louvers.
Operating flexibility	2 speed motors 2 fans per cell 4 independent cells[11]	1 speed motors 2 fans per cell 3 independent cells	Three 1 speed motors One 2 speed motor 4 independent cells	1 speed motors 6 independent cells[11]
Maintenance facility	Fan stack access doors Fan floor access doors Basin access doors	Fan floor access doors Basin access doors	Fan floor access doors	Fan floor access doors Basin access doors

TABLE 2 — MATERIALS OF CONSTRUCTION for the four towers

	Rochester, Minn.	Chicago	Pittsburgh	New York City
Tower site	60 ft substructure on turbine room roof	20th floor roof, unobstructed	41st floor roof, unobstructed	40 ft substructure, 3-side unobstruction
Tower frame	Redwood	Steel	Redwood	Steel
Decking	Redwood	Redwood	Redwood	Redwood
Sheathing, inside	Zinc coated steel	Steel	Redwood	Cement board
Sheathing, outside	Aluminum	None	Redwood	None
Fan floor	Redwood	Steel	Aluminum	Steel
Fan stacks	Redwood, aluminum sheathed, 16 ft high	Steel, 4 ft high	Redwood, 5 ft high	Steel, 5 ft high
Fan supports	Tubular steel	Tubular steel	I-beam steel	I-beam steel
Fan blades	Monel metal	Monel metal	Monel metal	Monel metal
Basin	Steel	Steel	Steel	Steel

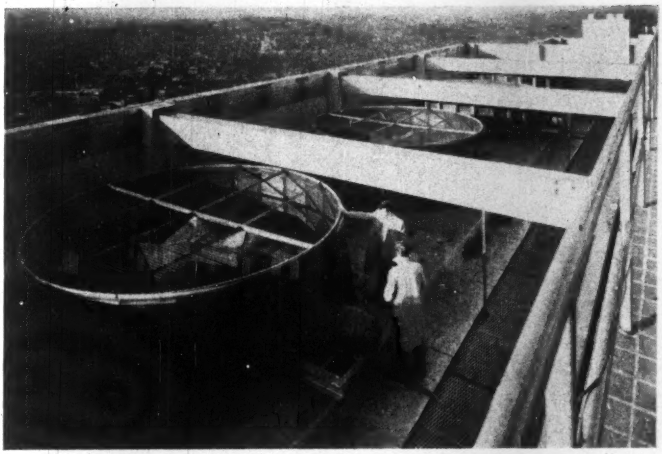
TABLE 3 — PHYSICAL PROPORTIONS and other data for the four towers

	Rochester, Minn.	Chicago	Pittsburgh	New York City
Water loading (gpm)	24,000[11]	6,000	7,648	12,000[11]
Height of fan stack above grade (ft)	100	230	500	74
Overall tower height (ft)	52	28	23	29
Static pumping head (ft)	31	19	16	19
Net effective height (ft)	30	18	14	18
Concentration (gpm/sq ft)	3.9	2.7	3.3	3.7
Tower dimensions (ft): Length, width, height	68 x 90 x 36	54 x 40 x 24	96 x 24 x 18	54 x 30 x 24
Date ordered	May 1950	Dec. 1947	May 1950	Dec. 1950
Date completed	Oct. 1951	July 1949	Sept. 1951	Aug. 1951
Insurability	Complete	Complete	Complete	Complete
Fire hazard	Nominal	Low	Low	Low
Material compatability	Accommodated	Accommodated	Complete	Accommodated
Structural stability	Complete	Complete	Complete	Complete
Building code	Uniform	City of Chicago	Uniform	City of New York
Distribution: Type	Low pressure	Low pressure	Low pressure	Low pressure
Main Headers	Redwood	Steel pipe	Redwood	Redwood
Laterals	Redwood	Steel pipe	Redwood	Redwood
Sprinklers[12]	Bronze	Bronze	Bronze	Bronze
Hardware: Castings	Bronze	None required	Bronze	None required
Bolts	Bronze	Cadmium on steel	Bronze	Galvanized steel
Nails	Bronze	Copper	Bronze	Bronze

tors, tower manufacturer and owners (Table 2). Physical proportions and other design data, reflecting thorough consideration of thermal duty, ambient influences, proximity to occupied premises, winter and summer wind direction and intensity, space availability and pumping head/fan horsepower evaluation, are compared in Table 3.

The Rochester tower,[6*] essentially a "street level" installation, combines the advantages of high structure and high fan stack velocities to offset the tendency of effluent vapor to recirculate into the lee side air inlet louvers. The lee side low pressure area, created principally by fan draft augmented by wind velocity, tends to establish a "sphere of influence" in which a recycling circuit elevates the entering air wet bulb temperature. Sound sources of objectionable frequency and intensity were isolated by installation of high fan stacks, double walled sheathing (zinc coated steel bitumastic treated inside, ribbed aluminum outside with a 6 in. air space between), rubber mounting of the mechanical equipment and elevated location. Narrow aluminum louvers (galvanically insulated) are set out from the decking to avoid erosion and ice accumulation. Enclosed vertical gearhead fan drives[1] avoid vibration and noise problems. Special five-pass angle batt drift eliminators serve to develop air flow distribution uniformly over the total tower area and to assure minimum moisture entrainment in the discharge vapor stream. An all redwood distribution system of the closed-flume type avoids use of dissimilar metals exposed to circulating water.

The Chicago tower[7] conforms fully to a strict building code specification in which steel frame, steel sheathed construction is required. Low fan rotational speeds were utilized to minimize vibration, air noise and drift loss. Elevated location, rubber mounting of the tubular fan drive supports[1] and monel metal airfoil section adjustable pitch fan blades[10] combine to minimize air noise, 60 cycle hum and flexible shaft alignment problems.



THE PITTSBURGH TOWER stands on a steel grillage 41 stories above street level, noise insulated by complete enclosure within masonry walls. Saturated vapor is discharged well above adjacent structures. Fan throat screens protect personnel and prevent birds nesting during inoperative periods. Fan throats are all-redwood, assembled from prefabricated panels[12]

The Pittsburgh tower[8] derives advantage from its position atop the building structure. Sound, fog, condensate and drift dissipate adequately in the surrounding atmosphere. Full utilization of redwood in the frame, sheathing, fan floor (aluminum covered) and fan throats eliminates the vibration contingency and reduces maintenance costs due to corrosion. Masonry enclosure, aluminum fan floor covering and close mesh fan stack screens reduce the fire hazard and insurance costs. Special worm gear speed reducers, developed expressly for cooling tower applications, permit low fan speeds in a single step reduction and adequate cooling effect to carry friction heat away from gear teeth and shaft bearings despite the elevated temperatures of the vapor surrounding the mechanism. Simplified water treating for algae, bacteria and fungi is indicated since circulating water is completely sunshaded.

The New York tower[9], essentially a "street level" job in a severely congested area, combines elevated location, complete acoustical treatment and anti-fogging devices[4] to preclude objections due to vibration, noise and condensate formation. The building code required steel frame, fireproof exterior surfaces and flameproofed redwood internal parts. Close proximity of occupied premises prompted special sound control treatment of both the air inlet area (for water falling noise) and vapor discharge area (for air noise and fan blade fundamentals and harmonics). Full precaution was taken to minimize drift and objectionable moisture conditions above the tower — particularly condensate formation on windows of adjacent offices. Fan capacity was increased proportionately to allow for the air flow resistance developed by the sound baffles and to provide sufficient diluent air for the prefogging function. Relatively low air velocities within the structure permit close approach to complete adiabatic saturation of the vapor leaving the cooling chamber, resulting in minimum fresh air requirements to gain greatest possible benefit from the diluent air stream.

Close Cooperation Aids Best Design

Of singular importance in the development of specific designs for cooling tower functions is the close cooperation of architect, engineer, contractor, tower manufacturer and operating personnel. So completely dependent is each function upon another that seldom may one be separated for individual analysis without loss to the ultimate objectives.

The aerodynamic engineer suggests higher fan speeds for greater efficiency while the sound analyst shows advantages in lower blade tip speeds. The thermodynamic specialist encourages higher heat loading

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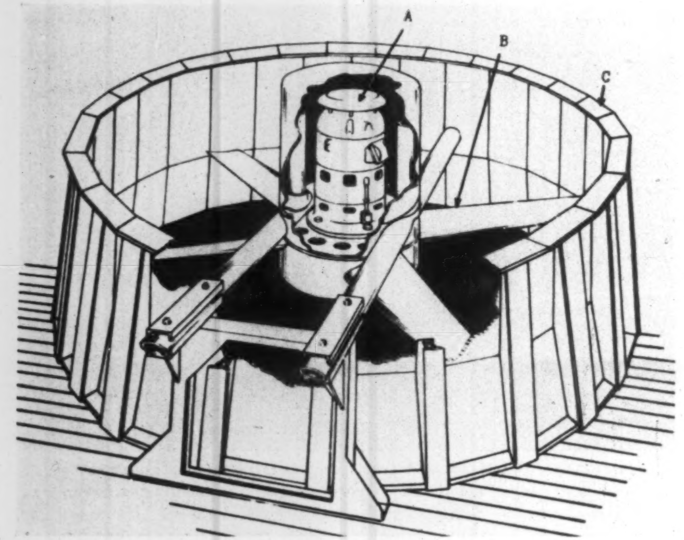
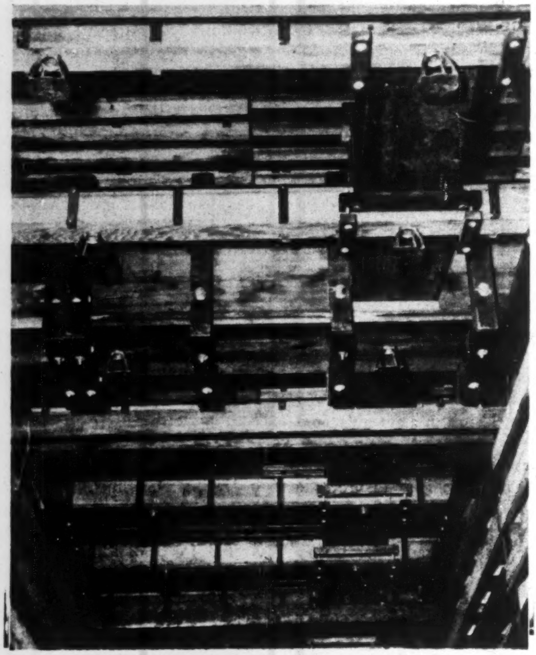
*See references at end of article.



SCHEMATIC VIEW OF vertical gearhead (A) fan drive assembly[1] showing tubular supports, pipe risers within hood and circular apertures in base plate forming air flow ducts for fresh ventilating air. Motor and gear are protected from corrosive action of discharge vapors leaving tower. Adjustable pitch fan blades (B) are formed of monel. Fan throat (C) is assembled from prefabricated redwood panels



REDWOOD DISTRIBUTION SYSTEM of the closed-flume type, viewed from below after decks have been removed. Cross header and main headers are of bolted "tank-type" construction. Laterals are copper-strap banded.

to gain greater "flash" transfer and higher mean temperature differences between the circulating water and the inlet air, while the structural designer argues for lower frame dimensions to reduce unit stresses and member sizes. To the hydraulics expert it appears uneconomical to pump high gallonage, but to the heat exchanger designer high Btu per gal ratios seem desirable. The electrical specification may call for single speed, single winding, four pole machines with simple magnetic switch control while the operating engineer may prefer two-speed, two-winding, multi-pole machines with reversing switch gear including fused disconnects in series with time delay speed controllers. The architect would prefer to hide the tower or bury it in a light well, while the plant engineer knows the coldest water comes from the open, exposed location. The building code dictates one material to the consternation of the maintenance superintendent who points to the advantages of the natural corrosion resistance of some other material. The contractor may prefer to handle the entire installation with a carpenter crew, while trade practices conscientiously divide the work between the steamfitters, welders, plumbers, millwrights, sheet metal men, riggers, electricians, teamsters, laborers and steel workers. The water treating chemist wants pH control favoring the metal in the system, and the lumber supplier sees the normal life of his redwood jeopardized by delignification. The utilities superintendent asks for a larger tower with less electrical demand and the real estate department pleads the case of the small tower with higher operating costs. And so the problem goes . . . .

A compromise is quite definitely indicated. To achieve satisfactory performance, economical operation and wholesome compromise of dissenting opinions, a cooling tower engineer is often called upon to consolidate divergent thoughts into a unified effort toward the absolute objective — to dissipate the heat ultimately into the surrounding atmosphere, without rattling the dishes in Mrs. Hubbard's cupboard.

New approaches to old problems are apparent in Table 1. The variety of material combinations shown in Table 2 merely emphasizes the advancement made by the cooling tower industry within the last decade. Extensive development programs are continuously qualifying better materials, improved designs and greater mechanical reliability.

Cooling tower fans, once limited to welded steel, fixed pitch construction and 8 ft diameters, are now available in monel metal, stainless steel, plastic, aluminum and impregnated laminated wood (plastic clad) in diameters up to 22 ft, in three-bladed to 16-bladed designs, all with adjustable pitch features. Fan drives, once limited to slow speed direct drive or standard speed belt drive with horizontal sleeve bearing motors, are now available in enclosed frames, standard synchronous speed, gearhead or shaft connected, vertical or horizontal, in standard sizes from 5 to 75 hp, ball bearing fitted and with windings effectively treated for operation in continuously saturated atmospheres at elevated temperatures. Induced draft designs with improved efficiencies are widely used. Accumulated knowledge of the basic technology[14] now permits accurate determination of tower proportions, of deck spacing, of optimum balance between drop-wise and film-wise surface, of air velocities, fan speeds, gear ratios and air resistances.

References Cited in Tables and Text

[1] Unitized, self-ventilated integral vertical gearhead (planetary type) fan drive with fan load carried directly on gear shaft.

[2] Complete design and installation by Industrial Sound Control, Inc., Hartford, Conn.

[3] Design developed by Neil D. Adams, Superintendent, Franklin Heating Station. (Patent applied for).

[4] Prefogging device with adjustable orifice apertures regulating flow of diluent air.

[5] Thermal capacity, expressed in Btu per hr dissipation to atmosphere by combined latent and sensible heat transfer resulting from water vapor diffusion within the apparatus.

[6] Owner: Franklin Heating Station, Rochester, Minn. Induced draft, counterflow type tower.

[7] Induced draft, counterflow type tower.

[8] Owner: 525 Wm. Penn Place Corp., Pittsburgh. Induced draft, counterflow type tower.

[9] Owner: Empire State Bldg. Corp., New York City. Induced draft, counterflow type tower.

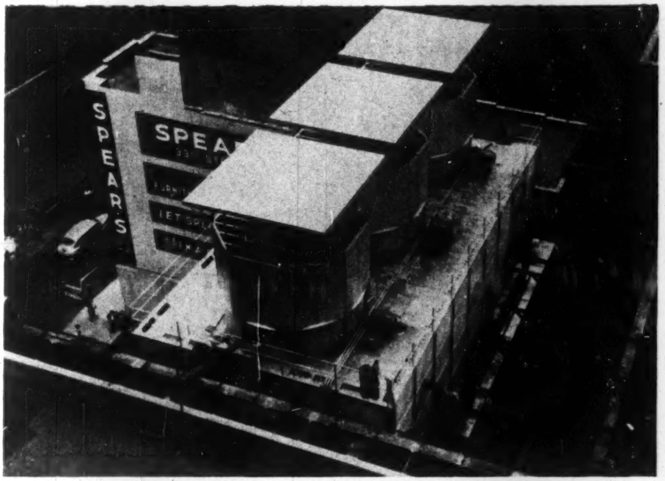
[10] Stressed skin design with welded steel hub.

[11] Ultimate capacity indicated. One-half capacity now operating.

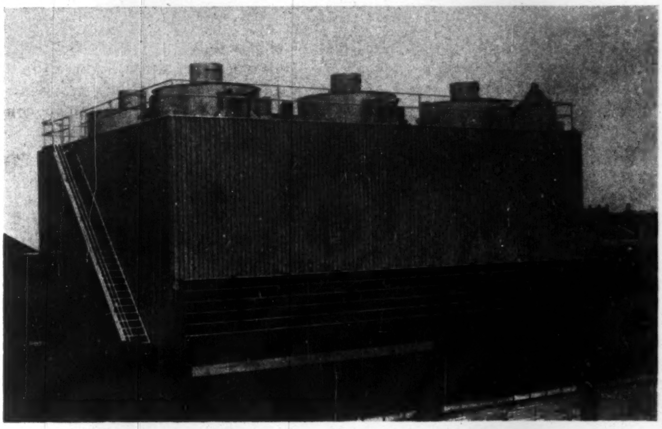
[12] Low pressure, self-cleaning gravity type cast bronze sprinkler-distributors.

[13] Modified venturi section, Olin design. (Patent applied for).

[14] Basic technology, in this situation, combines psychrometric data and gas diffusion phenomena correlated with empirical knowledge accumulated without the benefit of standardized instrumentation or uniform testing procedures.



SOUND CONTROL MUFFLERS shrouding fan throats and sound control absorption-type baffles covering air inlets give the New York tower a unique appearance. Elevated location, with steel substructure and grillage, avoids vibration transmission into occupied premises. Fog and condensate are minimized by diluent fresh air blending within the structure. Driftage is virtually eliminated by tight eliminators and internal baffling



THE CHICAGO TOWER design meets rigid building code requirements for metropolitan fire zone installations. Zinc-coated, ribbed steel panels, neoprene-gasketed, form watertight sheathing. Use of long, rolled sheet steel avoids horizontal seams. Vertical gearmotor hoods control ventilating air flow during operation and protect drives from weather during winter

Effective Heat and Heat Loss Calculations

By C. O. Mackey and N. R. Gay
Professor and Associate Professor of Heat-Power Engineering
Cornell University

Because the principal function of a heating unit is not merely the condensation of steam — and because the type of heating installed in a building influences the rate of heat loss from the structure — the application of some sort of "effective heat factor" to capacity tests of heating units is indicated for greater accuracy in design of a heating system, the authors believe

In the paper *Principles of Effective Heat for Steam-Heated Structures*, published in the ASHVE Journal Section in the January 1951 HPAC, results obtained under a test program sponsored by the Convector Manufacturers Association at Cornell University were presented showing tests of radiators and convectors using steam as the heating medium. Many writers have pointed out the fallacy of using the steam condensing capacity of a heating unit as a sole measure of its performance in creating a comfortable physical environment. The electrical engineer, interested in lighting, has faced and solved a similar problem. He does not use the electrical power input to a lighting fixture as a measure of illumination usefully received on some plane of work. Instead, he has defined a measure of illumination of a surface in terms of foot-candles — not kilowatts.

Measuring Performance of Heating Units

The application of an "effective heat factor" or a "useful heat factor" to the results of capacity tests of heating units is one method of recognizing the fact that the principal function of a heating unit is *not* the condensation of steam. There would be no purpose at all in "adjusting" the results of a test on the steam condenser of a steam power plant; its function is to condense steam, and the weight of steam condensed per hour is a good measure of its performance. Different heating units installed in the same room with the same outdoor conditions will, however, release heat at different rates under equilibrium conditions when maintaining the same air temperature at the same point in the room.

It has already been shown in the article in the December HPAC in simple examples by theoretical reasoning how the type of heating influences the rate of heat loss from a structure. Also, different types of heating systems set up different ceiling to floor air temperature differentials which, in turn, influence the rate of heat loss. Some heating units are installed in physical contact with exterior walls, and another effect on local heat loss is introduced. What is the reasoning that supports the principle of using an effective heat factor? Is it sound or is it fallacious to "adjust" the results of capacity tests? In principle, if not in magnitude, it is just as important to "adjust" the results of a capacity test as it is to measure illumination in foot-candles rather than kw.

One experimental method of measuring effective heat may be based upon the following procedure:

1) Select some heating unit as the standard with which other heating devices are to be compared;
2) Choose the location of an index point and the property that is to be measured at this point as an indication of comfort;
3) In a capacity test of the cold room type, install the standard heating units in the test room and with a fixed temperature in the cold shell space and a fixed rate of infiltration, measure rates of heat emission and corresponding air properties (indicating comfort) at this index point;
4) Install the non-standard heating units in the same test room and measure the rates of heat emission and corresponding air properties at the index point for the same cold space temperature and the same infiltration rate as used in the tests of the standard units.

As in the preparation of any test code, there are arbitrary decisions to be made if this procedure is to be followed. For example, what should be selected as the "standard" heating unit? Sound reasoning would dictate that the standard heating unit should be one that is generally recognized as being neither over-rated nor under-rated in the usual capacity test; in other words, the output of the standard unit in the capacity test should balance the heat loss that would be calculated for the structure if the heat loss calculation is made in the conventional manner. The purpose of a capacity test of a heating unit is to establish ratings which will enable the engineer to select a unit with the capacity required to balance the *real* heat loss of the structure. Cast iron radiators six tubes deep and 32 in. high were selected as the standard units in the paper previously mentioned.

How Determine Comfort?

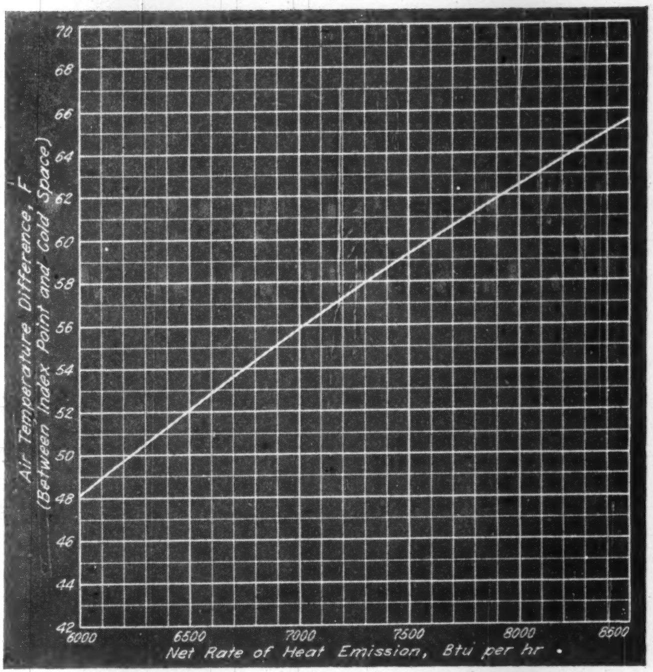
The second arbitrary decision that must be made is the selection of the property to be measured as an indication of comfort. Either the dry bulb temperature of the air or the "operative" temperature might be chosen. The acceptance of operative temperature has not been wide. In the 1950 ASHVE Guide, for example, an equation appears for operative temperature as a function of air temperature, mean radiant temperature, air velocity and average skin temperature — this equation does not appear in the 1951 Guide.

If air velocity and average skin temperature are considered to be of secondary importance, operative temperature depends upon dry bulb temperature and mean radiant temperature. When either convectors or radiators are used in the common enclosure, there is not a large difference between air temperature and mean radiant temperature in the living zone. For many practical purposes, then, air temperature may be used as a single and simple measure of that property of the environment that affects the rate of heat loss from the human body by convection and radiation. Furthermore, it is the property of the environment that is "sensed" by the ordinary thermostat.

The third arbitrary decision is the location of the index point in the room where air temperature is to be measured. There should not be great objection to locating the index point in a vertical line at the center of the room. Regarding the vertical location of the index point, however, there is less chance of unanimous agreement. In many of the early tests, air temperatures at the 60 in. level were always reported, although Dr. C. W. Brabbee early advocated an 18 in. level. Later tests have stressed the importance of lower levels, and the trend in location of the index point has been downward through 48 in. to 30 in. The sensitivity of the ankle to temperature change is well known, and this may have had some effect upon the trend. The authors of the paper on effective heat based many of their conclusions upon conditions existing at the 24 in. level, although there was criticism of the choice of the level by some who discussed the paper.

Example of Determining Effective Heat

As an example of the determination of effective heat and of its significance, let us assume that: (1) the standard units are cast iron radiators six tubes deep and 32 in. high, (2) the dry bulb temperature of the air at the 24 in. level in the center of the test room is used as the index of the physical properties of the environment. Standard capacity tests may then be made of, say, four radiators, each with a different number of sections. In each test, the temperature of the air in the cold shell space and the controlled rate of infiltration of shell space air into the test room will be held constant. As a result of these four tests, a graph may be prepared to show the difference between the room air temperature at the index point and the air temperature in the cold shell space plotted against the net rate of heat emission. The results of actual tests are shown in the graph.



CAPACITY TESTS of "standard" units

The next step is to conduct standard capacity tests of the non-standard heating units in the same test room with the same cold space temperature and the same controlled rate of infiltration of cold air as existed in the capacity tests of the standard heating units. For example, the test of a front outlet convector with a nominal height of 20 in., a length of 36 in. and a depth of 6 in. might show a net rate of heat emission of 6120 Btu per hr with an air temperature difference between index point and cold shell space of 56.2 F.

If the net rate of heat emission of the non-standard unit is q Btu per hr, and the net rate of heat emission of the standard unit is q_s Btu per hr when tested in the same room, with the same temperature difference between index point and cold space, and the same rate of infiltration, the proposed definition of effective heat (expressed in percent) is

$$EH = 100\ [(q_s/q) - 1]$$

From the graph, it is seen that the net rate of heat emission of the standard unit for a temperature difference of 56.2 F is 7055 Btu per hr (this is q_s). The effective heat for this front outlet convector is, then,

$$EH = 100\ [(7055/6120) - 1]$$
$$= 15.3 \text{ percent}$$

In other words, the *net* rate of heat emission of the standard heating unit must be 15.3 percent greater than that of the non-standard unit when maintaining the same air temperature at the index point in the same room with the same air temperature in the cold space and the same controlled rate of infiltration.

The capacity tests are conducted under equilibrium conditions, and the *total* rate of heat emission of the heating unit must balance the loss of heat from the test room. (The difference between the *total* and *net* rates of heat emission from the heating unit is the so-called "no load" rate of heat emission, which represents heat released in the room from piping connected to the heating unit.) Clearly, then, the rate of

COMPARISON of calculated and observed rates of heat loss

Heating unit	Calculated* heat loss, Btu/hr q_c	Observed heat loss, Btu/hr q	Ratio q_c/q
7-section C. I. radiator	5445	6140	0.887
8-section C. I. radiator	5996	6779	0.884
9-section C. I. radiator	6525	7263	0.898
10-section C. I. radiator	6784	7767	0.873
12-section C. I. radiator	7414	8677	0.854
Front outlet convector 12" (nom.) high	5985	5917	1.011
Front outlet convector 20" (nom.) high	6322	6314	1.001
Front outlet convector 24" (nom.) high	6368	6605	0.964
Front outlet convector 32" (nom.) high	6345	6934	0.915
Top outlet convector 12" (nom.) high	7526	7767	0.969
Top outlet convector 20" (nom.) high	5670	5646	1.004
Top outlet convector 24" (nom.) high	6176	6469	0.955
Top outlet convector 32" (nom.) high	5715	6305	0.906

*This result is 112.5 times the difference between the observed temperature of the room air at the 24 in. level and the observed temperature of the air in the cold shell space.

loss of heat from the test room is greater with the standard than with the non-standard unit. This actual test reflects not only the effect of the type of heating unit used upon the inside surface coefficient of combined heat transfer but also the effects upon heat loss of floor to ceiling air temperature differential and local conduction through exterior walls, resulting from high room-side surface temperatures.

It should be emphasized that the tests reported here do not represent any new or revolutionary test procedure. They are simple capacity tests conducted in accordance with *Commercial Standard CS 140-47 for Testing and Rating Convectors* with the cold room type of test.

The question raised is based upon the *use* of the results of such capacity tests. Should we simply ignore the fact that it may be demonstrated that one type of heating unit, when installed in a given room, will maintain a desired air temperature at a chosen index point with a lower rate of heat emission than some other heating unit? If so, what is the significance of a capacity test?

The purpose of a capacity or rating test should be to permit the selection of the correct number of heating units, or the extent of heating surface, to balance the *real* (not the *calculated*) heat loss from a structure when a certain air temperature is maintained at a chosen index point under design outdoor conditions.

The procedure previously outlined is not the only one that might be followed in balancing capacity with heat loss. It is not necessary, for example, to introduce the concept of the "standard" heating unit, if the rate of heat emission of a unit is compared with a calculated rate of heat loss. For example, the rate of heat loss from the Cornell cold room may be calculated on the assumption of a constant room air temperature. The calculated rate of heat loss by transmission from the room is 99.5 Btu per hr for each degree of temperature difference; for the controlled infiltration rate of 12 cfm, the rate of heat loss is 13 Btu per hr for each degree of temperature difference. Consequently, the total rate of heat loss is 112.5 Btu per hr for each degree of temperature difference.

In the table, a comparison is made between *calculated* rate of heat loss from this test room and the *actual* rate of heat loss (the gross rate of heat emission from the heating unit) found for several different heating units in tests previously reported. It will be noted that, in this comparison, the heat loss is calculated on the assumption that there is a uniform air temperature everywhere in the room that is the same as the air temperature observed during the capacity tests at the 24 in. level in the room center; it is further assumed that there is no effect of the heating unit on the local room-side surface temperatures and that the indoor air surface coefficient of combined heat transfer is 1.65. Some of these assumptions are, of course, in error, but the result is the conventional method of calculating heat loss.

If the room air temperature observed at some level other than the 24 in. level were used as the uniform room air temperature, different results would be found for the ratio of the calculated to the observed rate of heat loss. For example, if the 48 in. level had been chosen, all the ratios would be increased; for the cast iron radiators, the ratio would have been about 1.0 rather than about 0.88

The significance of these results is that if the conventional procedure were followed in selecting a heating unit that would produce an air temperature of, say, 65 F at the 24 in. level in this test room, the cast iron radiators and most of the convectors would create a lower air temperature at this level. Also, if a procedure were followed in selecting a heating unit (that paid no attention to effective heat) to maintain an air temperature of, say, 65 F at the 48 in. level, the cast iron radiators would just about accomplish the desired result, while all the convectors would be over-sized.

What's To Be Done About It?

In summary, it appears that the engineer has three choices in selecting heating units to create a desired environment:

1) He may continue to *miscalculate* heat loss in the conventional manner, and make no additions to or reductions in capacity as observed in rating heating units; the desired environment will not then be produced.

2) He may continue to *miscalculate* heat loss in the conventional manner by paying no attention to the effect on this loss produced by the type of heating unit selected and "adjust" the capacities observed in standard tests to compensate for this mistake.

3) He may try to calculate a different heat loss for each type of heating unit that might be used and make no "adjustment" of the capacities observed in the standard tests of the heating units.

There are many engineers who vigorously oppose the "adjustment" of capacity tests. They are not advancing sound engineering principles unless they recognize that the calculation of the heat loss should then be "adjusted" for the type of heating.

What, then, should be done about this problem—(1) Nothing? (2) "Adjust" capacity tests? (3) "Adjust" heat loss calculations?

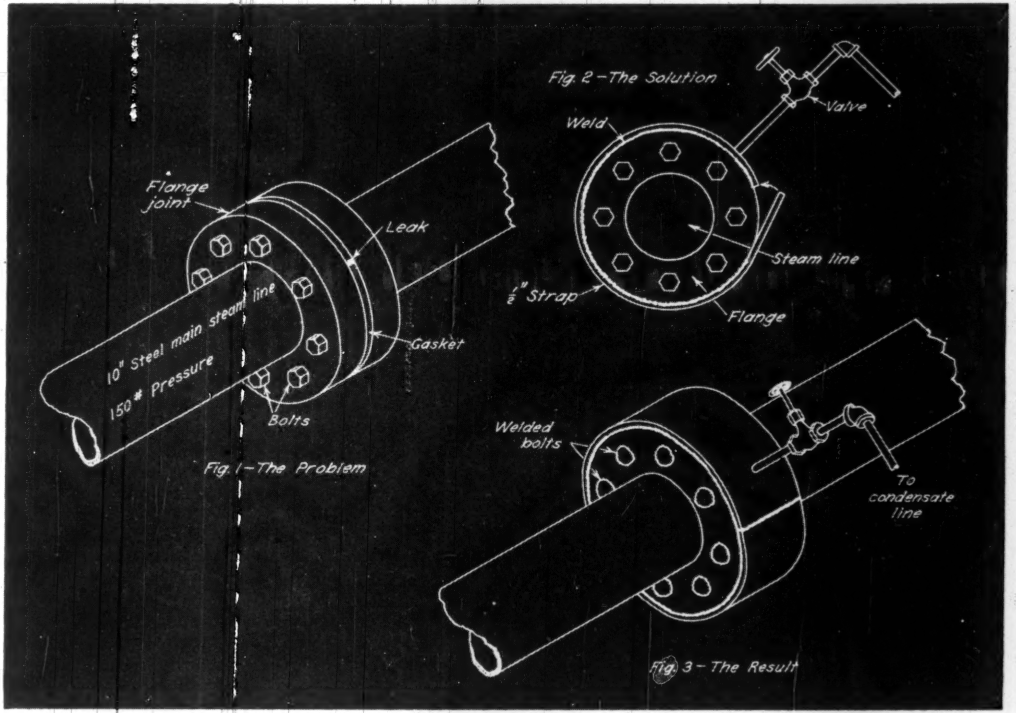


Fig. 1—The Problem

Fig. 2—The Solution

Fig. 3—The Result

Emergency Repair for Leaking Steam Line

Steel Strap Rolled Around Flange and Welded To It

By Charles Knight and Charles Fishkin
Plastics Div., Monsanto Chemical Co.

PIPING IS AN essential service in many an industrial process; frequently, shutdown of a pipe line in a plant would mean shutting down the plant as well. Where this is the case, the operating staff must often exercise considerable ingenuity in keeping a piping system in service until permanent repairs or replacement can be made. Here's an example:

THE PROBLEM (FIG. 1)—The gasket in a flange joint on a 150 psi steam main was leaking. If the line were shut down to replace the gasket, it would have resulted in a partial shutdown of the plant, since the remaining lines could not supply all the needed steam.

THE SOLUTION (FIG. 2)—The line was not shut down. Instead, all the bolts, heads and nuts on the two flanges were welded to the flange to prevent leakage around the bolts. Next, two rolled semicircular sections of ⅜ in. steel plate were placed around the flange and blocked in place.

A pipe nipple had been welded into one of the steel ring sections and an open valve was installed on the nipple.

The steel sections were welded to the flange while leaking steam was vented through the valve.

Welding was done slowly and on alternate sides so as to prevent undue stresses.

RESULT (FIG. 3)—The line was kept in service.

In order to relieve undue pressure on the steel ring, the valve was connected to a low pressure main and opened, bleeding the leaking steam into this line.

Atomic Pile Heats Buildings at Harwell, England

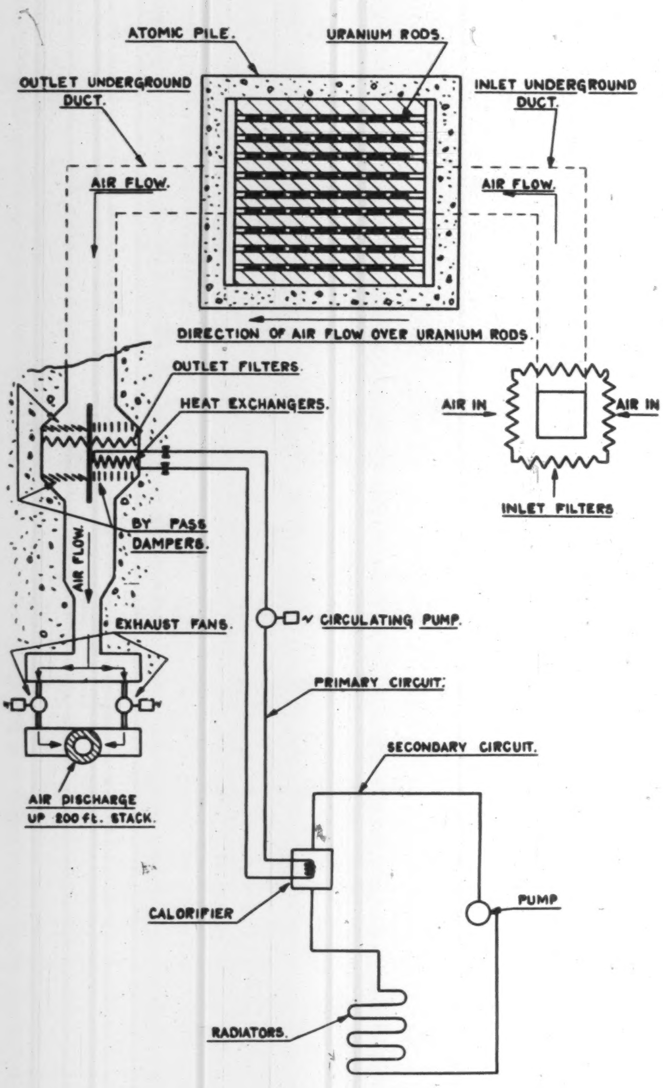
[First details of a heating plant which utilizes waste heat from an experimental atomic pile are reported by our correspondent in London]

SUCCESSFUL TESTS have recently been completed on what may be described as the first atomic central heating plant in the world. It is at the British Ministry of Supply's atomic research establishment at Harwell.

Large quantities of air are used for cooling the atomic pile at Harwell, but it cannot be used directly for heating because of the danger from radioactivity. A dual system of heat interchange is therefore employed. Air at 135 F from the pile's cooling system is passed over an air-water heat exchanger from which water at 130 F is pumped to heating and hot water supply "calorifiers". The primary heat exchanger measures 10 ft x 10 ft x 2 ft 6 in. and weighs 8 tons.

The plant is not yet complete. Only one building, consisting of 80 offices, is at present heated. It is expected later to connect additional buildings, when the full designed output of the primary heat exchanger — 7 million Btu per hr — will be utilized. Modifications to be completed in 1952 are expected also to achieve a substantial increase in water temperatures.

The installation will cost about £15,000 and is expected to result in an overall net saving of £2650 per annum.


ATOMIC PILE.
URANIUM RODS.
OUTLET UNDERGROUND DUCT.
INLET UNDERGROUND DUCT.
AIR FLOW.
AIR FLOW.
DIRECTION OF AIR FLOW OVER URANIUM RODS.
OUTLET FILTERS.
HEAT EXCHANGERS.
AIR IN
AIR IN
INLET FILTERS
BY PASS DAMPERS.
AIR FLOW.
EXHAUST FANS.
CIRCULATING PUMP.
PRIMARY CIRCUIT.
SECONDARY CIRCUIT.
AIR DISCHARGE UP 200 ft. STACK.
CALORIFIER
PUMP
RADIATORS.

DUAL SYSTEM of heat interchange is employed, as the air for cooling the pile can't be used for building heating because of danger from radioactivity

"STRING-SAVERS" IMPEDE PRODUCTION

MANY SMALL PLANTS impede production because they are "string-savers," Frank K. Shallenberger, associate professor of industrial management at Stanford University's graduate school of business, declared at the annual meeting of the American Society of Mechanical Engineers. Poorly planned plants cluttered with miscellaneous junk and hampered by antique equipment make good shop housekeeping impossible, he said.

Power Plant Piping

By Hugh Welshman, Jr.
Manager, Industrial Piping Div.
Grinnell Co., Inc.,

Careful consideration should be given the design, manufacture, fabrication, installation and operation of modern piping systems. Present piping developments add to the necessity for proper engineering interpretation, specialized facilities, rigid inspection and control, and skilled shop and field supervision

THE MERIT OF A well-designed piping system can be judged on the basic principles of mechanical design, such as (1) selection of pipe sizes to allow reasonable velocities and friction losses; (2) strength of parts to provide flexibility within allowable stress limits; (3) selection of materials to provide stability under service temperatures and pressures for the life of the plant; and (4) selection of hangers and supports to prevent additive stresses and the shifting of pipe weight loads to connecting equipment.

Code requirements for piping and the determination of pipe sizes were discussed in the December HPAC, and Fig. 1 and Table 1, giving data on flow of steam, were presented.

Determination of Pipe Wall Thickness

For general design purposes, a formula for the calculation of pipe wall thickness has been developed to comply with the American Society of Mechanical Engineers Power Boiler Code and the American Standards Association Code for Pressure Piping. This equation is given in Fig. 2 along with a graph for allowable *S* values. This formula and graph of allowable *S* values provides a minimum pipe wall thickness for various steels used in power plant piping at various operating temperatures. Table 2 lists allowable *S* values as given in the ASA pressure piping code. If the piping under consideration falls under the jurisdiction of the ASME boiler code and the temperatures are below 650 F, values for 650 F should be used to comply with this code.

The various American Society for Testing Materials specifications of materials for which plots in Fig. 2 have been made specify that the minimum wall thickness at any point shall not be more than 12.5 percent under the nominal wall thickness specified. The value of t_m used in calculating pressure values by use of the formula is, therefore, equal to 87.5 percent of the nominal wall thickness.

SYMBOLS

A_I is inside area of pipe cross section.
A_M is metal area of pipe cross section.
β is stress coefficient for curved pipe.
D is outside diameter of pipe.
F is force (in direction indicated by subscript).
M is moment.
M_R is modulus ratio.
P is pressure, psi gage.
S is allowable stress.
s is unit stress.
S_m is section modulus of pipe cross section.
t is pipe wall thickness.
t_m is minimum pipe wall thickness.
T is torque, or temperature in degrees Fahrenheit.

A careful review of all codes will indicate variances in allowable *S* values and design service pressures for different systems and parts of a system. Examples of definite requirements under different codes is best given by quoting from the ASME boiler code and the ASA pressure piping code on boiler feed piping.

ASME Boiler Code

> P-24 (1) "For piping between the boiler up to and including the required stop valve and the check valve, the value of *P* shall be not less than 1.25 times the lowest pressure at which any safety valve on the boiler drum or water space is set to blow.
>
> (2) "For piping between the check valve and the globe or regulating valve, when required by Par. P-317, and including any bypass piping up to the shutoff valves in the bypass, the value of

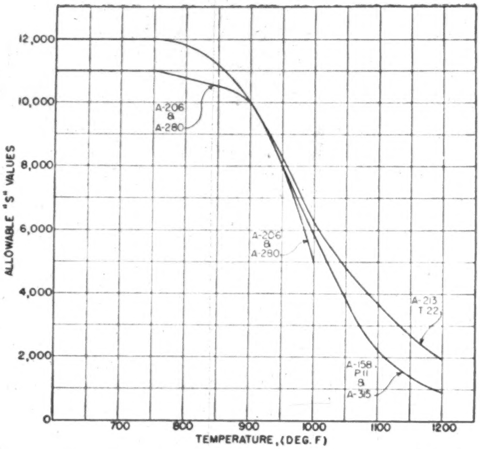


FIG. 2 — ALLOWABLE *S* VALUES. Information for plotting these curves was obtained from the ASME boiler code, 1949. Values of *S* between −20 F and 650 F are the same as values of *S* at 650 F. The ASME boiler code and the ASA pressure piping code state that the minimum pipe wall thickness shall be determined from the formula

$$t_m = [PD/(2S + 0.8P)] + C$$

where t_m is minimum pipe wall thickness, in.; *P* is maximum material service pressure, lb per sq in. gage; *D* is outside diameter of pipe, in.; *S* is allowable stress in material due to internal pressure, at operating temperature, lb per sq in.; *C* is allowance for threading, mechanical strength and/or corrosion, in. (*C* is 0.05 in. for plain end steel pipe 1 in. and smaller, and is 0.065 in. for plain end steel pipe larger than 1 in.)

P shall be not less than the pressure required to feed the boiler.

(3) "The *S* values used shall not exceed that permitted for the temperature of saturated steam corresponding to the lowest set pressure of any safety valve on the boiler drum or to the maximum water temperature to be handled, whichever is greater."

ASA Code for Pressure Piping

144 (c) "Boiler feed piping systems shall be designed for the highest pressure exerted by the boiler feed pumps at any load under normal operation and on the highest corresponding temperature actually existing. Where water passes through heaters in series, the temperature rating of the piping shall conform to the actual temperatures produced by the heaters in each part of the system."

Expansion and Stresses

Piping systems should be designed to have sufficient flexibility to prevent thermal expansion or contraction from causing excessive stresses in the piping material, excessive bending moments at joints, or undesirable forces or moments at points of connection to equipment or at anchorage or guide points. Formal calculations should be required where reasonable doubt exists as to the adequate flexibility of the system.

Flexibility is provided by changes of direction or by the use of bends, loops and offsets.

In calculating the flexibility of a piping system between anchor points, it should be considered as a whole and all parts, straight as well as curved, should be considered as subject to flexure and stress.

In calculating the total expansion, not only the expansion of the line itself but also movements of the equipment to which it is attached shall be considered.

Calculations shall be made for both the hot and cold conditions, using the respective values of the modulus of elasticity of the pipe material for the hot and cold conditions.

In order to determine the effects of expansion and stresses within a piping system, it is necessary to know:

1) Which codes apply to the system.

2) The extreme pressure and temperature conditions.

3) The material specification.

4) The inside diameter of the pipe (or the pipe size).

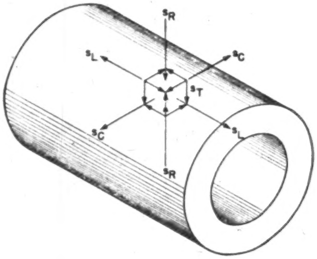
5) The tentative layout of the system, including overall dimension and space limitations (if changes prove desirable.)

Having established the basis of the problem, reference to the applicable code will establish minimum safety requirements for materials and dimensions with due regard to the hazards involved. Beyond this, the codes impose no restrictions on methods or procedures for determining anchor forces or internal stresses due to expansion or contraction.

The dimensional properties of pipe and certain empirical functions, which are used in stress calculations, are available in tabular form for all the common pipe sizes and wall thicknesses. The formulas for their derivation are available for cases where the values are not tabulated.

In a single plane system, the stresses due to thermal changes are caused primarily by bending and shear. In a multiple plane system, torsional stresses will add to the former. These stresses are combined with those due to pressure and compared with the allowable combined stress, *S*, in accordance with code requirements.

In order to avoid additional stresses, the supports should be de-



s_L = Longitudinal Stress

s_C = Circumferential or Hoop Stress

s_R = Radial Stress

s_T = Shear or Torsional Stress

FIG. 3 — AN ELEMENT OF PIPE wall is subjected to four stresses

signed to carry the weights involved, to permit unrestrained thermal movement, and prevent load shifting due to change in position.

Combining Stresses

An element of pipe wall is subjected to four stresses, as shown in Fig. 3. The following gives the intensity of these stresses and the manner in which they are combined to derive their resultant:

s_L is the sum of three component parts:

1. Bending stress due to thermal expansion

For straight pipe:

$$s_B = M/S_m$$

For curved pipe:

$$s_B = (M/S_m)\,\beta$$

2. Bending stress due to the weight of the pipe (When the piping system is properly supported this stress becomes negligible and is not considered in these computations.)

3. Longitudinal stress due to internal pressure

$$s_P = P\,(A_i/A_M)$$

Both significant stresses act in the same direction, therefore:

$$s_L = s_B + s_P$$

TABLE 2 — ALLOWABLE *S* VALUES for pipe in power piping systems

Material[1]		ASTM specification	Minimum ultimate tensile strength	Values of *S* (psi) for temperatures (F) not to exceed- 650	700	750	800	850	900	950	1,000	1,050	1,100
Seamless steel:													
Grade A		A 106	48,000	9,600	9,100	8,250	7,250	5,850	4,400	2,600			
Grade A, silicon-killed[3]													
0.10-0.25 silicon	●	A 106	48,000	9,600	9,250	8,700	8,000	6,850	5,600	3,800	2,000		
Grade B, silicon-killed													
0.10 min, silicon		A 106	60,000	12,000	11,400	10,400	9,100	7,400	5,600	3,800	2,000		
Grade A		A 53	48,000	9,600	9,100	8,250							
Grade B		A 53	60,000	12,000	11,400	9,950							
Type A low-carbon	●	A 83		9,400	9,000	8,150	7,150	5,850	4,400	2,600	1,350		
Low-carbon	●	A 179		9,400	9,000	8,150	7,150	5,850	4,400	2,600	1,350		
Low-carbon	●	A 192		9,400	9,000	8,600	7,900	6,800	5,600	3,800	2,000		
Medium-carbon	●	A 210		12,000	11,400	10,400	9,100	7,400	5,600	3,800	2,000		
Electric-fusion-welded steel:													
Grade A		A 155	45,000	8,100	7,900	7,550	6,200	5,150	3,950	2,350			
Grade B		A 155	50,000	9,000	8,650	8,100	6,750	5,400	3,950	2,350			
Grade C		A 155	55,000	9,900	9,350	8,550	7,200	5,700	3,950	2,350			
Grade A, silicon-killed[3]													
0.10-0.25 silicon	●	A 155	45,000	8,100	7,900	7,550	6,850	6,000	5,050	3,400	1,800		
Grade B, silicon-killed[3]													
0.10-0.25 silicon	●	A 155	50,000	9,000	8,650	8,100	7,450	6,250	5,050	3,400	1,800		
Grade C, silicon-killed[3]													
0.10-0.25 silicon	●	A 155	55,000	9,900	9,350	8,550	7,950	6,500	5,050	3,400	1,800		
Electric-resistance-welded steel:													
Grade A		A 53	48,000	8,150	7,750	7,000							
Grade B		A 53	60,000	10,200	9,700	8,450							
Grade A		A 135	48,000	8,150	7,750	7,000							
Grade B		A 135	60,000	10,200	9,700	8,450							
Grade A Low-carbon	●	A 178		8,000	7,650	6,950							
Low-carbon	●	A 214		8,000	7,650	6,950							
Low-carbon	●	A 226		8,000	7,650	6,950							
Lap-welded steel		A 53	45,000	7,300	6,800	6,250							
Butt-welded steel		A 53	45,000	5,400	5,100	4,700							
Lap-welded wrought iron		A 72	40,000	6,400	6,100	5,500							
Butt-welded wrought iron		A 72	40,000	4,800	4,600	4,150							
Seamless steel:													
Carbon-molybdenum steel	●	A 206	55,000	11,000	11,000	11,000	10,750	10,500	10,000	8,000	5,000		
Chrome-molybdenum													
0.50-0.70 Chromium													
0.45-0.65 Molybdenum													
0.80-1.10 Chromium	●	A 335	60,000	12,000	12,000	12,000	11,800	11,200	10,000	8,000	5,850	3,850	2,200
0.45-0.65 Molybdenum													
1.00-1.50 Chromium	●	A 158	60,000	12,000	12,000	12,000	11,800	11,200	10,000	8,000	5,850	3,850	2,200
0.45-0.65 Molybdenum													
Grade P-11													
2.75-3.25 Chromium	●	A 213	60,000	12,000	12,000	12,000	11,800	11,200	10,000	8,250	6,250	4,800	3,700
0.80-1.00 Molybdenum													
Grade T-21													
2.00-2.50 Chromium	●	A 213	60,000	12,000	12,000	12,000	11,800	11,200	10,000	8,250	6,250	4,800	3,700
0.90-1.10 Molybdenum													
Grade T-22													
4.0-6.0 Chromium													
0.50 Molybdenum,	●	A 158	60,000	12,000	12,000	12,000	11,800	11,200	10,000	8,000	5,850		
Grade P5													
Chromium-nickel grades													
TP 321, TP 347	●	A 213		15,000	15,000	14,600	14,300	14,000	13,400	12,300	10,000		
Electric-resistance-welded steel:													
Chromium-nickel grades													
TP 321, TP 347	●	A 249		12,750	12,750	12,400	12,150	11,900	11,400	10,450	8,500		

● NOTE: The *S* values for 650 F shall apply for all temperatures up to 650 F.

[1] Pipe in accordance with API Specification 5L may be used as specified in Par. 105(e).

[2] The several types and grades of pipe tabulated above shall not be used at temperatures in excess of the maximum temperatures for which the *S* values are indicated. (See also specific requirements for service conditions contemplated.) Allowable *S* values for intermediate temperatures may be obtained by interpolation.

[3] While it is possible to purchase pipe to this analysis, the silicon content shown is not in accordance with the specification listed.

NOTE: Where welded construction is used, consideration should be given to the possibility of graphite formation in the following steels: Carbon steel above 775 F; carbon molybdenum steel above 875 F; chrome molybdenum steel (with chromium under 0.60) above 975 F.

s_C is primarily due to internal pressure.

$$s_C = P\,(D - t)/2t$$

s_R is negligible and is not considered in these computations.

s_T is the sum of two component parts:

1. Torsional stress resulting from thermal expansion (This condition occurs only in multiple plane systems.)

$$s_T = T/2S_m$$

2. Direct shear stress is negligible and is not considered in these computations.

When the torsional stress is negligible, only the longitudinal stress is significant and the resultant fiber stress, s, is determined from the formula:

$$s = s_L = s_B + s_P$$

When the torsional stress is significant (as may be the case in multiple plane systems), the resultant fiber stress is derived from the following formula:

$$s = \tfrac{1}{2}[s_L + s_C + \sqrt{4(s_T)^2 + (s_L - s_C)^2}]$$

In either case the maximum resultant fiber stress, s, within the piping system must not exceed the allowable stress, S, for the pipe material at maximum operating temperature.

Values for S are found from tables in the governing code. In the ASA code B31.1 the tabular values for S, under certain conditions specified in paragraph 620g, may be increased as follows:

In Power Piping Systems:

For an operating temperature (T_0) of 650 F or below

$$S = 1\tfrac{1}{2} \times S_{\text{at } 650}$$

For an operating temperature (T_0) above 650 F

$$S = \tfrac{3}{4}\,(S_{\text{at } 650} + S_{\text{at } T_0})$$

Where an increase over tabular values is not expressly provided for, the value for allowable stress S must be taken directly from the table.

Where the torsional stress is zero or negligible, the resultant fiber stress, s, is:

$$s = s_L = s_B + s_P$$

and from code requirements we know that:

$$s \leq \text{Allowable Combined Stress, } S$$

or

$$s_B \leq S - s_P$$

Where a piping system is subject to temperature changes of a definitely cyclic nature or to severe vibration that may result in failure by fatigue, the limit of the safe combined stress permitted by the ASA code shall be divided by 2.

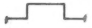
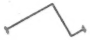
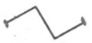
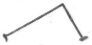
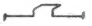
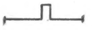
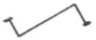
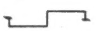
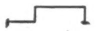
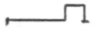
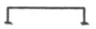
COMPARATIVE		
Maximum Bending Stress	Resultant Anchor Force	
100	219	
106	100	
127	164	
144	113	
147	400	
246	372	
259	300	
261	563	
281	349	
287	506	
441	612	

FIG. 4 — RELATIVE MERITS of several tentative piping layouts, wherein two points are connected by the same total footage of pipe arranged in various configurations, are indicated by these scale sketches. Values given are expressed as percentages of the lowest value

In order to facilitate the calculation of stresses and anchor forces, tables have been prepared for various configurations commonly encountered in piping work [see *Piping Design and Engineering*, published by the Grinnell Co., Inc., 1951].

These tables of common shapes are also helpful in comparing the relative merits of several tentative piping layouts. The function is illustrated in the scale sketches in Fig. 4, wherein two points are connected with the same total footage of pipe arranged in various configurations. The comparative values for bending stress and anchor force are derived from the values in the various tables and are expressed as a percentage of the lowest value.

When the configuration of a piping layout is such that the tables of common shapes will not apply, it of course becomes necessary to resort to the use of basic equations, in which it is necessary to compute the line inertias of the various component parts of the piping system.

Cold Springing of Piping Systems

A piping system may be cold sprung, or prestressed, to reduce anchor forces, moments, and stresses caused by thermal expansion. This is accomplished by shortening the overall length of pipe by any desired amount not in excess of the calculated expansion. The amount of cold spring, *C.S.*, is usually expressed as a percentage or fraction of the total expansion △.

This procedure is recognized only by the ASA code B31.1 (paragraph 620e and f), which states in part: ". . . two-thirds of . . ." the cold

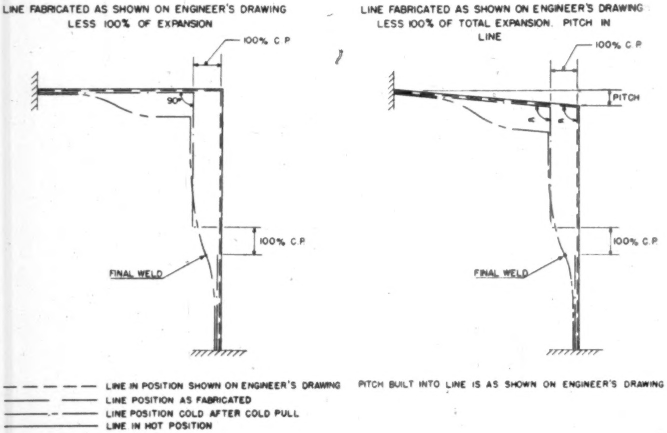

LINE FABRICATED AS SHOWN ON ENGINEER'S DRAWING LESS 100% OF EXPANSION
100% C.P
90°
100% C.P
FINAL WELD
LINE FABRICATED AS SHOWN ON ENGINEER'S DRAWING LESS 100% OF TOTAL EXPANSION. PITCH IN LINE
100% C.P
PITCH
100% C.P
FINAL WELD
LINE IN POSITION SHOWN ON ENGINEER'S DRAWING
LINE POSITION AS FABRICATED
LINE POSITION COLD AFTER COLD PULL
LINE IN HOT POSITION
PITCH BUILT INTO LINE IS AS SHOWN ON ENGINEER'S DRAWING

FIG. 5 — HOW LINE IS FABRICATED in order to have a 100 percent cold pull or prestress both with pitch and without pitch for drainage

spring ". . . may be considered as reducing the total expansion. While piping may be cold sprung more than half its computed expansion, the maximum credit allowed shall not exceed one-third the computed total expansion. The full amount of the cold spring shall be taken into account, however, in considering the forces, moments and stresses acting in the cold condition.

"Calculations shall be made for both hot and cold conditions, using respective values of the modulus of elasticity. . . ."

This excerpt from the code is interpreted as follows:

Maximum credit for cold spring $= 2/3$ C.S.

Maximum credit for cold spring $= 1/3\Delta$.

By equating the two values.

$$2/3\ C.S. = 1/3\Delta$$
$$C.S. = \Delta/2$$

In other words, the maximum credit for cold spring allowed by the ASA code is derived when $C.S. = \triangle/2$. The code does not prohibit the application of cold spring greater than $\triangle/2$.

In the calculation of stresses, values for F, M, s_B, etc., are found for the condition of maximum operating temperature and no cold spring. All of these values are directly proportional to $\triangle$. Credit for cold spring is expressed as an adjustment of $\triangle$. Therefore, the permissible cold spring adjustment of F, M, s_B, etc., is expressed by the following ratios:

Hot Condition Ratio

$= [(\Delta - 2/3\ C.S.)/\Delta]$ or $2/3$ (whichever is greater)

Cold Condition Ratio

$= -\ (C.S./\Delta\ M_R)$ (minus indicates opposite direction)

Fig. 5 illustrates how a line is fabricated in order to have a 100 percent cold pull or prestress both with pitch and without pitch for drainage. Note the angle at which the turn is fabricated is of the same degree as when the line is in the hot position. The choice of location of the final weld is a matter to be discussed with the field.

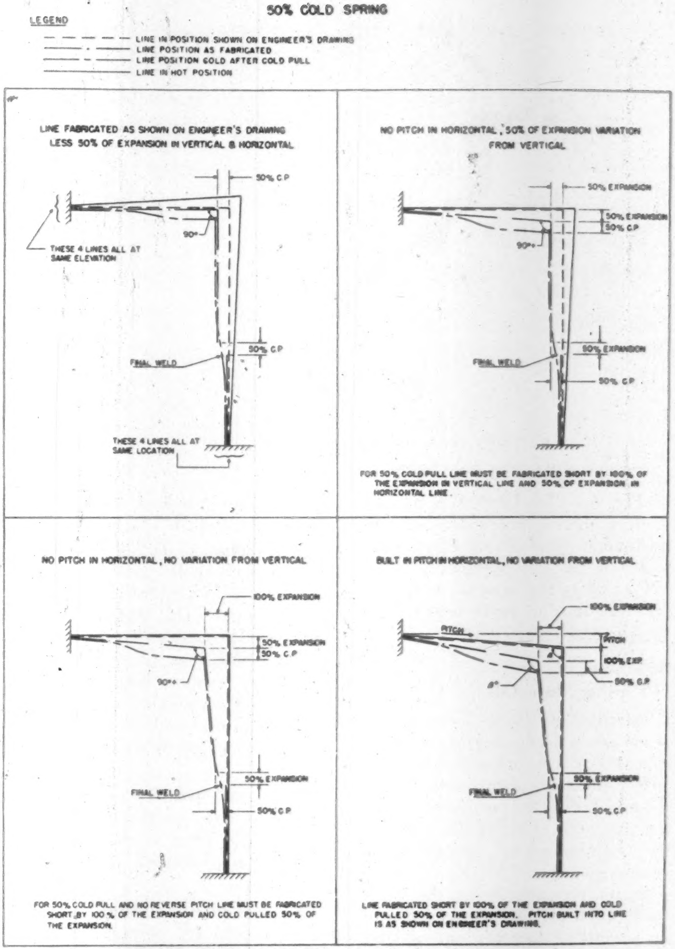

50% COLD SPRING
LEGEND
LINE IN POSITION SHOWN ON ENGINEER'S DRAWING
LINE POSITION AS FABRICATED
LINE POSITION COLD AFTER COLD PULL
LINE IN HOT POSITION
LINE FABRICATED AS SHOWN ON ENGINEER'S DRAWING LESS 50% OF EXPANSION IN VERTICAL & HORIZONTAL
50% C.P
90°
THESE 4 LINES ALL AT SAME ELEVATION
50% C.P
FINAL WELD
THESE 4 LINES ALL AT SAME LOCATION
NO PITCH IN HORIZONTAL, 50% OF EXPANSION VARIATION FROM VERTICAL
50% EXPANSION
50% EXPANSION
50% C.P
90°+
50% EXPANSION
FINAL WELD
50% C.P
FOR 50% COLD PULL LINE MUST BE FABRICATED SHORT BY 100% OF THE EXPANSION IN VERTICAL LINE AND 50% OF EXPANSION IN HORIZONTAL LINE.
NO PITCH IN HORIZONTAL, NO VARIATION FROM VERTICAL
100% EXPANSION
50% EXPANSION
50% C.P
90°+
50% EXPANSION
FINAL WELD
50% C.P
FOR 50% COLD PULL AND NO REVERSE PITCH LINE MUST BE FABRICATED SHORT BY 100% OF THE EXPANSION AND COLD PULLED 50% OF THE EXPANSION.
BUILT IN PITCH IN HORIZONTAL, NO VARIATION FROM VERTICAL
100% EXPANSION
PITCH
PITCH
100% EXP
50% C.P
θ°
θ°
50% EXPANSION
FINAL WELD
50% C.P
LINE FABRICATED SHORT BY 100% OF THE EXPANSION AND COLD PULLED 50% OF THE EXPANSION. PITCH BUILT INTO LINE IS AS SHOWN ON ENGINEER'S DRAWING.

FIG. 6 — SAME LINE AS IN Fig. 5 required to be prestressed 50 percent. Upper left sketch is *a*, upper right *b*, lower left *c*, and lower right sketch is *d*

In Fig. 6 the same line is required to be prestressed 50 percent. Examination of Fig. 6a shows what will result if the line is cut short by 50 percent of the computed expansion. It will be noticed that when the line goes from the cold position to the hot position, 100 percent expansion results — thus forcing the line off the horizontal and vertical. The line no longer meets the requirements of the engineer's drawing and in addition, produces an undesirable effect in that a reverse pitch results. Though not a serious problem in this instance, if allowed to occur in a more complicated piping arrangement such a situation would cause pockets for condensation. Paragraph 620 (i) of the piping code specifically states that "Vertical lines shall be so designed that as actually installed and supported they allow proper pitch for draining the adjacent horizontal lines when hot." The words "when hot" are too often disregarded in this matter.

Fig. 6b shows the same piping layout with the line cut short by 100 percent of the expansion in the vertical member and fabrication of the angle at the turn being such that a 50 percent pull is made in order to close the final weld. This method corrects the reverse pitch in the horizontal member but, however, the vertical member has a slight inclination in the hot position. This inclination can be corrected by cutting the horizontal member short by 100 percent of the expansion and again changing the fabrication angle at the turn to maintain a gap of 50 percent of the expansion at the final weld location. This is illustrated

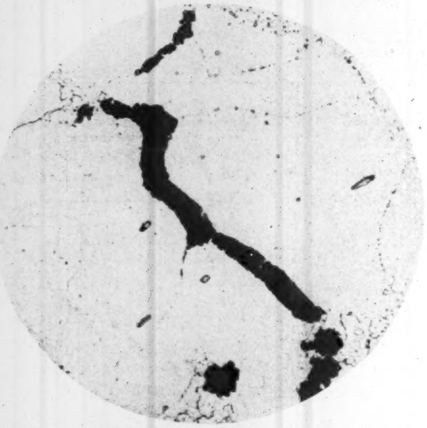


FIG. 7 — **PRECIPITATON OF GRAPHITE** may occur as thin plates along grain boundaries

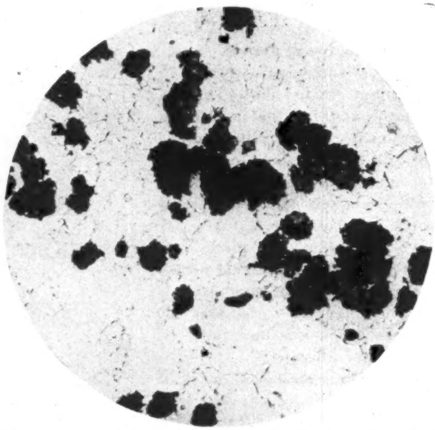


FIG. 8 — **GRAPHITE PRECIPITATION** may also occur as scattered nodules distributed at random

in Fig. 6c. By fabricating in this manner, the engineer's drawings are met and any undesirable effects eliminated in the hot position.

Fig. 6d is the same as 6c except for the built-in pitch required on the engineer's drawing.

Selection of Piping Materials

Selection of piping materials for steam power plants requires a knowledge of current industry-wide practices. Research organizations and manufacturers are constantly seeking improved materials for handling the ever-increasing problems encountered.

Steam pressures cover the range up to 2500 psi and temperatures of up to 1100 F are now encountered. These extremes may be exceeded in tomorrow's developments.

The severe service conditions found in main steam and reheat lines of central power stations have been successfully handled with a variety of materials. If structural stability is a factor of consideration, the limiting temperature in general practice for use of carbon steel is 750 F and for carbon moly 850 F. Temperature ranges, as practiced in central power stations, for low alloy steels are given in Table 3.

TABLE 3 — PIPING MATERIALS

Maximum design temperatures, F	ASTM pipe specifications
1050	A-213 Symbol T22
1025	A-158 Symbol P3b
1000	A-158 Symbol P11
975	A-315
950	A-280
875	A-206
775	A-106 Grade A or B
750 (250 psi max.)	A-53 Grade A or B

The limitation of 250 psi at 750 F in Table 3 applies to piping within the scope of the ASA Code for Pressure Piping. This limitation does not apply to piping within the scope of the ASME Power Boiler Code.

Valves, welding fittings, flanges etc., should be selected so as to have a chemical composition the same as, or as close as possible to, that of the pipe.

In power plant piping, ASTM A-315 is now preferable to A-206 and A-280, since it exhibits more stability in service and is more readily available.

Table 4 gives a list of suggested specifications for other piping materials, such as flanges, fittings, bolting, gaskets, valves, etc. for various service pressures and temperatures.

Today's extreme pressure and temperature ranges demand pipe sizes and wall thicknesses beyond the capacities of existing seamless pipe mills. This has made it necessary to use forged, turned and bored tubing. Recently, the ASME boiler code committee has approved the use of fusion welded rolled alloy plate pipe for reheat piping, provided it complies with the pertinent parts of the unfired pressure vessel code, including stress relieving and radiographic examination of the longitudinal weld. (Note: Particular consideration must be given to the difference in manufacturing tolerances of these materials from that of seamless when determining pipe wall thickness.)

An unstable state has been found to exist in carbon and some low alloy steels under certain combined conditions of composition, physical structure and stress when they are subjected to elevated temperatures for long periods of time. This has been evidenced by the reversion of the carbides to their equilibrium form of graphite and iron and is of particular concern because of ever-increasing demands for higher serv-

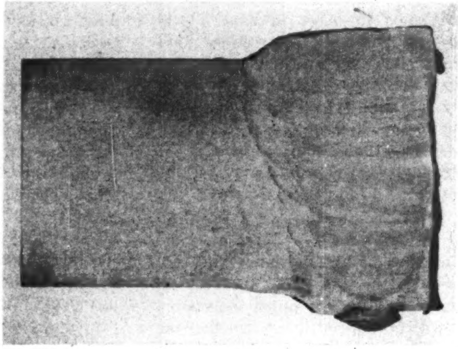


FIG. 9 — **MACROGRAPH** showing, from left to right, base metal, heat affected zone, and weld metal

ice temperatures and pressures. The imposed conditions of heat and stress over long periods of time tend to cause the disassociation of unstable carbides which results in the ultimate precipitation of free carbon in the form of graphite. This reaction is commonly called graphitization.

The precipitation of graphite may occur either as thin plates along the grain boundaries as shown magnified 500 times in Fig. 7 or as scattered nodules distributed at random throughout the grains as shown in Fig. 8.

TABLE 4 — SUGGESTED SPECIFICATIONS for power piping materials

Service	Max. Pressure P.S.I.	Max. Temp. °F	Pipe or Tubing (A.S.T.M. Spec.)	Butt Welding Fittings (Material Spec.)	Flanges and Socket Weld Fittings (A.S.T.M. Spec.)	Joints	Bolting	Gaskets	Valves	
									2" and smaller	2½" and larger
Steam	The wall thickness is the only limiting condition of Max. Pressure	1050	A-213 T-22	A-213 T-22	A-182 F22	2½" and over: Butt Welded 2" and smaller: Socket Welded except Welding Neck Flanges at connections to flanged equipment	Studs—A-193 Gr. B14 Nuts—A-194 Class 3 with Class 7 combination fit	Monel, Annealed	A-182 F22	A-217 WC9
		1025	A-158 P3b	A-158 P3b	A-182 F1 with 1.75–2.25% Chromium added				A-182 F1 with 1.75–2.25% Chromium added	A-217 WC1 with 1.75–2.25% Chromium added
		1000	A-158 P11	A-158 P11	A-182 F1 with 1.00–1.50% Chromium added				A-182 F1 with 1.00–1.50% Chromium added	A-217 WC6
		975	A-315	A-315	A-182 F2				A-182 F2	A-217 WC1 with 0.80–1.10% Chromium added
		950	A-280	A-280	A-182 F1 with 0.50–0.70% Chromium added				A-182 F1 with 0.50–0.70% Chromium added	A-217 WC1 with 0.50–0.70% Chromium added
Steam, Water, Oil	Above 400 The wall thickness is the only limiting condition of Max. Pressure	875	A-206	A-206	A-182 F1	2½" and over: Butt Welded 2" and smaller: Socket Welded except Welding Neck Flanges at connections to flanged equipment	Studs—A-193 Gr. B14 Nuts—A-194 Class 2H with Class 7 combination fit	Metallic-Asbestos	A-182 F1	A-217 WC1
		775	A-106 Gr. A & B; A-155 Gr. A & B	A-106 Gr. A & B	A-105 Gr. I or II				A-105 Gr. I or II	A-216 WCA& WCB
Steam, Water, Oil	Above 250 up to 400	775	A-53 Gr. A & B; A-135 Gr. A & B	A-106 Gr. A & B	A-105 Gr. I or A-181 Gr. I for 300# Max. at 800° F	2½" and over: Butt Welded 2" and smaller: Socket Welded except Welding Neck Flanges at connections to flanged equipment	Above 160 PSI Studs—A-193 Gr. B14 Nuts—A-194 Class 2H with Class 7 combination fit 160 PSI and below—Sq. Hd. Bolts A-107 with heavy finished nuts	Up to 600° F Copper, up to 750° F Comp. Asbestos, over 750° F Metallic Asbestos	A-105 Gr. I or A-181 Gr. I for 300# Max. at 800° F	A-95
Steam, Water, Oil	125 to 250	450	A-53 Gr. A & B; A-106 Gr. A & B	A-106 Gr. A & B	Flanges—A-181 Gr. I Fittings—2" and smaller 300# Malleable Iron Screwed A-277	2½" and over: Butt Welded except Welding Neck Flanges at connections to flanged equipment 2" and smaller: Screwed joints	Commercial C. S. Bolts with Unfin. Amer. Std. Sq. Hd. A-307 Gr. A Nuts. Comm. C. S. Semi-Fin. Heavy U.S.S. Hex. to match Bolts A-194 Class O	Comp. Asbestos	300# Bronze-Screwed Ends	300# Steel Flanged A-95 or 250# Cast Iron Flanged A-126
Steam, Water, Oil, Air	Up to 125	450	A-53 Gr. A & B; A-106 Gr. A & B	A-106 Gr. A & B	Flanges—A-181 Gr. I Fittings—2" and smaller 150# Malleable Iron Screwed A-277	2½" and over: Butt Welded except Welding Neck Flanges at connections to flanged equipment 2" and smaller: Screwed Joints	Commercial C. S. Bolts with Unfin. Amer. Std. Sq. Hd. A-307 Gr. A Nuts. Comm. C. S. Semi-Fin. Heavy U.S.S. Hex. to match Bolts A-194 Class O	Comp. Asbestos	150# Bronze-Screwed Ends	150# Steel Flanged A-95 or 125# Cast Iron Flanged A-126

The heat affected zones of steel adjacent to welded joints (as illustrated in Fig. 9) appear to be particularly susceptible unless the material has been suitably heat treated after welding.

The rate of the reaction, which is relatively slow in the range of 850 to 1000 F, increases rapidly as the temperature is raised, until in the range between 1350 to 1450 F, where the carbon tends towards resolution. The addition of chromium, separately or in conjunction with other strong carbide formers — such as tungsten, vanadium, columbium, or titanium — tends to stabilize the structure and inhibit the formation of graphite.

Service at elevated temperatures and high pressures requires piping materials which will remain in a constant condition and be normally resistant to corrosion, erosion, and high temperature oxidation up to the maximum conditions for which the system has been designed. Such material must have and maintain adequate resistance to creep and stress rupture and must exhibit a high degree of structural stability over long periods of time. Good welding properties are of the utmost importance, and the material should be of such nature as to permit it to be rolled, expanded, bent, flanged or otherwise formed. Although many of the alloy steels are air-hardening to a degree, suitable methods of annealing or stress relieving following welding have been devised.

[*To be continued*]

HEAT PUMP HAS INDUSTRIAL USES

THE HEAT PUMP is ideally suited to many industrial processes where heating, cooling, humidifying and dehumidifying are necessary to maintain production standards. There are many applications where large quantities of cold liquid and hot liquid may be simultaneously required. The heat pump can supply both the necessary refrigeration and heating at a relatively high coefficient of performance, since each service may be considered a byproduct of the other. The industrial processes generally classified under the heading of evaporation, distillation and drying offer seemingly unlimited possibilities to the heat pump because of its flexibility in design, high operating efficiency and ability to maintain evaporative temperatures at low levels within a narrow range.

Possible industrial applications for the heat pump include chocolate and candy making, milk pasteurization, drying of hay, corn, tobacco and other agricultural products, concentration of dyes and other chemicals in solution, preparation of foodstuffs, concentration of unfermented fruit juices, condensed milk, or sugar syrups, evaporative processes in preparing powdered milk, table salt or sugar, recovering of valuable solvents used in manufacturing operations, distillation of water to remove impurities and foreign matter which would otherwise affect the potability or the utility of the water for drinking purposes or for manufacturing processes, and the distillation of make-up water in steam power plants.

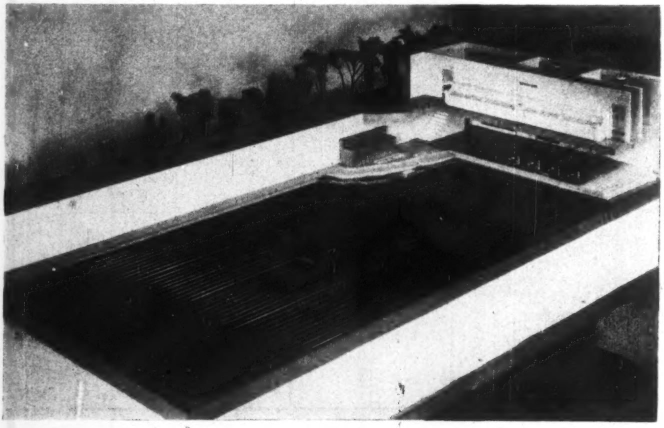
Henry E. Voegeli, in his article *Heat Pumps Do Double Jobs* in the October HPAC, describes several possible and interesting applications. Dissipating the condenser heat by means of embedded coils was one of the installations included. Personally, I would favor an indirect system in this case and would be rather hesitant of locating 5000 ft of "Freon-12" refrigerant piping below the floor because of the large amount of refrigerant involved and of the possible maintenance and service troubles due to leaks in the piping which may develop underground.

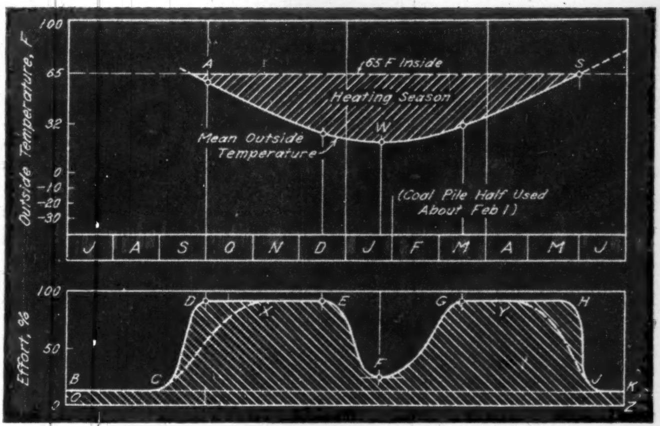
The heating of domestic hot water by means of a heat pump, similar to that described for a new commercial and technical school building in Canada, offers a much more practical application. The installation mentioned would have been much more attractive if the refrigerating effect produced could be usefully employed. A limited number of heat pump water heaters are now being manufactured which furnish the hot water requirements and also supply dehumidification and comfort cooling as byproducts. When hot water requirements are satisfied, independent dehumidification and comfort cooling can be obtained.

Using the heat pump to reclaim the heat from exhaust air offers a very attractive and practical installation in many commercial and industrial applications. A number of observations and field tests, recently made on a heat pump system supplying year 'round air conditioning to a modern six story office building and to a new 55 bed hospital, indicate that the performance and operating efficiencies were very satisfactory.

Heat pump installations in the industrial and commercial year 'round air conditioning field will undoubtedly increase as air conditioning engineers become more familiar with their design, operation and performance.—E. R. AMBROSE, Air Conditioning Engineer, American Gas and Electric Service Corp.

BEAUTIFUL SCALE MODEL of a supermarket food cooling system with underground condensing coils, as described by Henry E. Voegeli in his article on heat pumps in the October HPAC, was displayed by The American Brass Co. at the 7th All-Industry Refrigeration and Air Conditioning Exposition. The model is about 6 ft long





RELATIVE QUANTITY of steam for heating is indicated by the shaded area under the upper curve. The shaded area under the lower curve represents the effort at various times of the year when conservation of steam is most effective

Plan Fuel Conservation According to Season

Lyman R. Flook, Superintendent of Buildings and Grounds, University of Chicago (on leave of absence), shows here the quantity of steam required at various times of the year for heating buildings, and the "effort" required during the year for effective fuel conservation results

CONSERVATION OF FUEL for heating and other building uses is an important function of management. In times of high costs and scarce manpower, it offers great opportunities for savings with little or no reduction in results. Usually, a review of present heating practices will reveal many opportunities for worthwhile savings.

Opportunities for fuel conservation, and the effort needed to save fuel, vary according to the season of the year. For example, the accompanying graph shows the average mean outside temperature during the year for Chicago. The shaded area under 65 F in the upper curve indicates the relative quantity of steam required for heating (*AWS*). The shaded area in the lower sketch represents the "effort" at various times of the year for effective conservation (*ODHZ*).

The heating system is working to maximum capacity in the coldest weather, and is then operating most efficiently (*EG* on lower curve, *W* on upper curve). During this period of the year, reduced hours of use, weatherstripping, insulation, reduced ventilation when possible, and other such items produce the greatest savings. Individual or sectionalized steam-use peaks should receive maximum attention (*X* and *Y*).

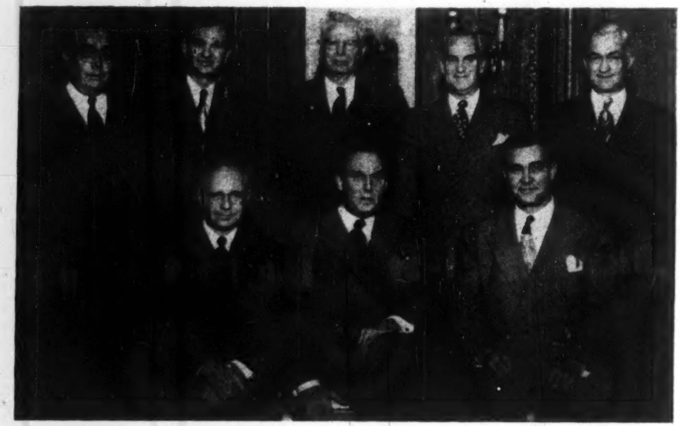
The basic and regular losses from the steam distribution system (*OB* and *KZ*) are worth careful consideration, as the savings from reducing such losses recur month after month and year after year.

The greatest savings can be made in autumn and in spring when the heating system is only partly loaded (*XE* and *GY*). Zone control, room control, reduced steam pressures, full vacuum and drainage problems should be studied with care. Early autumn (*DX*) and spring (*YH*) are not so productive of possible savings, because heating loads are light. In terms of effort, the relative cost to make savings at these times of the year is the greatest.

Measure Use To Justify Savings

Steam losses — evaluated in fuel cost of the steam — can be calculated if they can be measured. In this way, expenditures of money to save money can be evaluated and justified. Measuring devices which reveal the facts of operation are thus a first necessity in a steam conservation program.

Increased costs for fuel, labor and materials due to inefficiencies in operation of a heating system greatly exceed the costs of such measuring devices, piping changes, insulation improvements, weatherstripping, zone control, building control, and other ways of regulating temperature, pressure and ventilation. It is a wise procedure to know what the losses now are, to determine which ones should receive first attention, and to make the necessary improvements in equipment and operating methods to reduce them.



THE AIR CONDITIONING COUNCIL of Greater St. Louis was formed in 1949 by eight charter members, has grown to a membership representing 26 contractors, dealers and manufacturers. The eight charter members were (back row, left to right) Henry Weis, Jr., W. Kagan, W. C. Sodemann, R. W. Pocock, E. E. Edwards (and front row, left to right) H. S. Schiele, H. H. Piou and R. C. Denkman

St. Louis a Leading City in Using Air Conditioning

Its climate and its diversified industrial and commercial activities stress need for controlling indoor atmospheres . . . . Air Conditioning Council promotes the "air conditioning education and growth" of the city

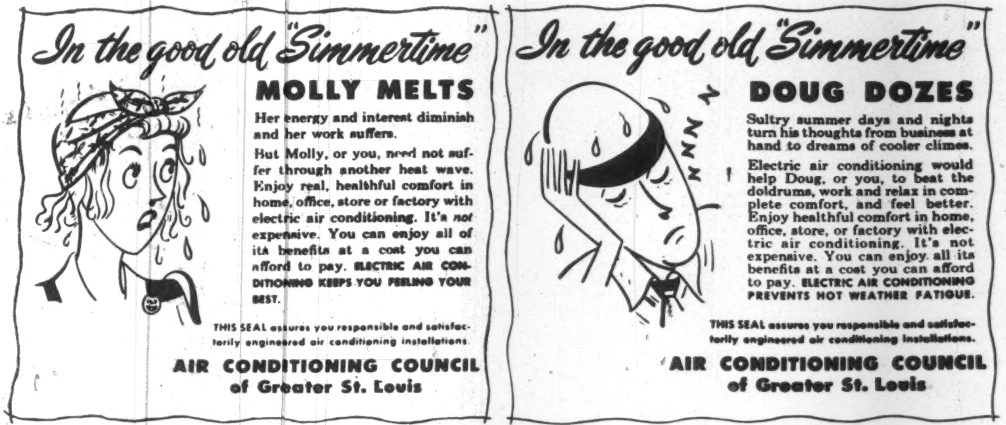
ST. LOUIS—the "city surrounded by the United States" and the host for this month's 58th annual meeting of the American Society of Heating and Ventilating Engineers—was labelled in the F. Scott Fitzgerald era of the 1920's as "first in shoes, first in booze". It now can well be termed a "first city in air conditioning" as well.

A number of factors contribute to the widespread use of air conditioning in St. Louis. Situated on the Mississippi a few miles below the mouth of the Missouri, it experiences periods in the summer of high humidity and temperature. The industries of St. Louis are large and diversified, ranging from furs and meat packing to the manufacture of shoes and patent and proprietary medicines, and many of them are important users of air conditioning. The plants and main offices of many prominent manufacturers serving the field of heating, piping and air conditioning are also part of the city's industry.

The Growth Since 1930

A survey of air conditioning as of May 31, 1930, showed that 20 installations had been made in St. Louis. Included were six theaters, eight industrial applications, three hotel restaurants, a salesroom, an executive office suite and one residence. During the spring and summer of this same year, 26 more installations were made, bringing the total at the year's end to 46 with a connected electrical load of 4101 kw. The 26 additional jobs included a completely air conditioned office building for one of the large shoe manufacturing companies, several restaurants, a number of small offices and five residences.

The use of air conditioning in St. Louis grew rapidly in the next 10 years. Figures from a survey made in 1940 show a total of 2833 installations, requiring 46,095 hp. A breakdown of this tabulation indi-


In the good old "Simmertime"
In the good old "Simmertime"
Z
Z
Z
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MOLLY MELTS

Her energy and interest diminish and her work suffers.

But Molly, or you, need not suffer through another heat wave. Enjoy real, healthful comfort in home, office, store or factory with electric air conditioning. It's *not* expensive. You can enjoy all of its benefits at a cost you can afford to pay. ELECTRIC AIR CONDITIONING KEEPS YOU FEELING YOUR BEST.

THIS SEAL assures you responsible and satisfactorily engineered air conditioning installations.

**AIR CONDITIONING COUNCIL
of Greater St. Louis**

DOUG DOZES

Sultry summer days and nights turn his thoughts from business at hand to dreams of cooler climes.

Electric air conditioning would help Doug, or you, to beat the doldrums, work and relax in complete comfort, and feel better. Enjoy healthful comfort in home, office, store, or factory with electric air conditioning. It's not expensive. You can enjoy all its benefits at a cost you can afford to pay. ELECTRIC AIR CONDITIONING PREVENTS HOT WEATHER FATIGUE.

THIS SEAL assures you responsible and satisfactorily engineered air conditioning installations.

**AIR CONDITIONING COUNCIL
of Greater St. Louis**

NEWSPAPER ADVERTISING was used by the Air Conditioning Council of Greater St. Louis last spring and summer in a 17 week campaign to stress the advantages derived from air conditioning. Here are two sample ads

cated 1263 residential, 1491 commercial and 79 industrial installations in use at that time.

An increase in St. Louis air conditioning installations of better than 300 percent took place during the 1940-50 decade. The breakdown of a 1950 survey includes 6155 residential, 6070 commercial and 146 industrial installations; a total of 12,371 jobs, with 108,631 hp.

Air Conditioning Council Organized

A factor in the development of air conditioning in St. Louis during the 1930's was the organization of an Air Conditioning Bureau, composed of contractors, dealers and manufacturers as well as the ice companies and also the refrigeration pipe line serving the downtown area. This organization proved of great value through its reputable membership not only in getting the story of air conditioning across to prospective users, but also in presenting it to the manufacturers of equipment. The efforts and promotional work of the Union Electric Co. of St. Louis were an instigating force behind the formation of the bureau.

The utility company recognized at this time that the promotion of air conditioning was a year 'round job. The company constructed and maintained in its building, during the summer and winter of 1932, an operating air conditioning exhibit, and concentrated on educational work with contractors, builders and architects. The bureau was dissolved in 1937, after accomplishing its purpose—establishing air conditioning as a necessity for health, comfort and increased efficiency.

In 1949, realizing the desirability of bringing industry and the public up-to-date on air conditioning developments, eight men representing manufacturers, contractors and dealers formed the Air Conditioning Council of Greater St. Louis. The council has grown to a membership at this writing of 26 companies. During the comparatively short time since its formation, the council has made a great deal of progress through its promotional activities in the "air conditioning education and growth" of St. Louis.

For example, the council sponsored—in the spring and summer of 1951—a 17 week newspaper advertising campaign stressing the health and comfort derived from electric air conditioning.

Hotels, Offices, Public Buildings

St. Louis hotels are largely air conditioned as regards their restaurants, cocktail lounges and public rooms; quite a number of the lobbies are also air conditioned. The installations include practically every type of equipment—from individual units to large central plants employing many methods of conditioning. According to the Hotel Association of St. Louis, 55 percent—3300—of the 6000 guest rooms in the 22 hotels represented in the association are air conditioned, and of these 22, five (the Statler, Jefferson, Mayfair, Lennox and Chase) are completely air conditioned.

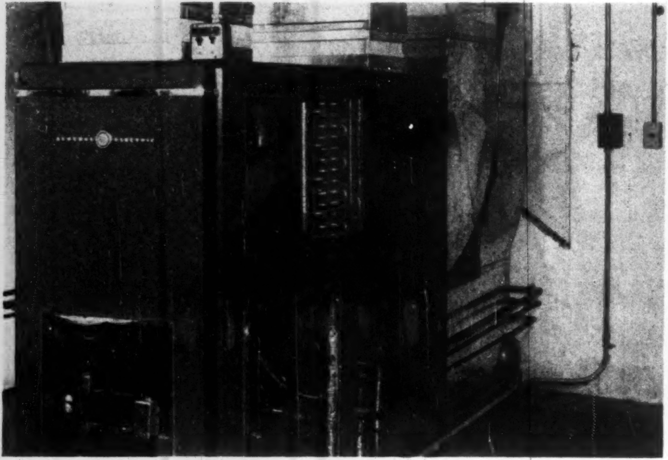
Eighty-five percent of the Sheraton's 500 rooms are conditioned, 55 percent of the De Soto's 250 rooms, 33 percent of the Melbourne's 350 rooms, and 30 percent of the Mark Twain's 300 rooms, according to the hotel association. The Park Plaza is also 30 percent air conditioned.

The Hotel Association of St. Louis is inclined to believe that St. Louis has the largest number of air conditioned hotel guest rooms of any city in the country. While Houston has also claimed the honor, it is understood that St. Louis looks with some suspicion on this Texas viewpoint.

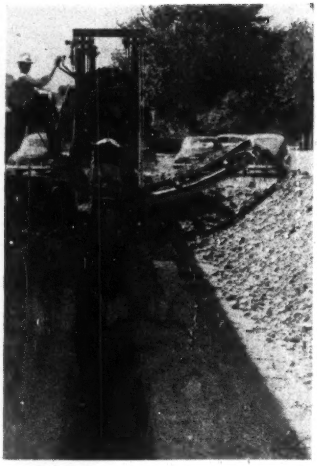
While no exact figures on the extent of general office space which is air conditioned in St. Louis seem to be available, a survey by the St. Louis Building Owners Association of 85 percent of the offices in the city indicated a total of 3,363,000 sq ft of space of which 1,551,000 is air conditioned.

Municipal and public buildings in St. Louis are also leaders in the use of air conditioning. For example, air conditioning was considered essential for the big Municipal Auditorium which was constructed in the 1930's and the air conditioning and heating of which were described in an article in the May 1936 HPAC.

Another example of public building air conditioning in St. Louis is



ST. LOUIS MARKED the 100th anniversary of the heat pump idea with the recent opening of the "New World" home in a suburb. Here is one of the 3 ton reverse refrigeration cycle units which provide year 'round heating and air conditioning



TRENCHING OPERATION for installing ground coils for the heat pump. A layer of sand above and below the tubing avoids dead air spaces

the more recent Clayton city hall. Four different types of systems are used to condition this building. The firemen's dormitory is conditioned with units handling outside air through precooling coils and recirculated air through a separate coil. The city offices utilize a perimeter unit system with preconditioned ventilation air supplied to each unit from a central ventilation fan system. The city council chamber and other meeting rooms each have separate draw-through fan systems. The new library addition is air conditioned with factory built, blow-through, multiple zone, central station units. The refrigeration equipment comprises two 30 hp compressors with an evaporative condenser and direct expansion water chiller. Heating is by gas fired boilers generating steam used for heating water and for direct radiation located throughout the building.

Another interesting "public building" application is the storage air conditioning job serving the Basilica of St. John's church, in St. Louis. The success achieved through the operation of this installation might well establish "an ecclesiastical precedent" in St. Louis, inasmuch as attendance at services increased greatly after the air conditioning.

Industrial air conditioning installations in St. Louis cover a wide variety of equipment types and uses, ranging from such applications as a 5 hp unit for air conditioning a room for bottling pharmaceutical products to an aircraft test room job for temperatures ranging from 185 F to −100 F, with a 280 hp refrigeration load.

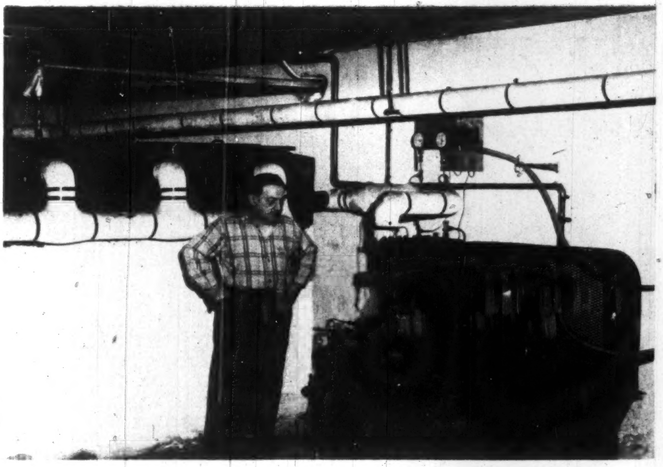
Heat Pump Recently Installed

It was just 100 years ago that Lord Kelvin proposed the "heat pump" idea. St. Louis jumped the gun, and marked the anniversary last November with the official opening of the "New World" home, in one of its suburbs. This is believed to be the first residence constructed by a merchant builder to be heated and cooled electrically by the heat pump.

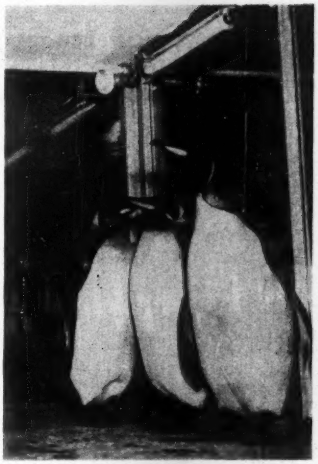
It was found to be of advantage to use two 3 ton units for separate zoned

CUMULATIVE REPORT of St. Louis air conditioning installations, showing classifications and required horsepower

	Classification	Total jobs (includes 11 months of 1951	Total combined hp
Residential	Private homes and apartments	7,720	7,297.41
Commercial	Apartment houses	17	418.52
	Banks	58	2,388.19
	Barber shops	27	77.97
	Beauty salons	67	288.88
	Churches	15	399.18
	Clubs	41	1,327.49
	Funeral directors	101	1,623.42
	Hospitals, general	32	734.57
	Hospitals, patients' rooms	38	45.99
	Hotels, guest rooms	54	2,848.76
	Hotels, public rooms	71	2,626.87
	Office buildings	76	9,963.78
	Offices, doctors & dentists	121	577.13
	Offices, miscellaneous	2,315	18,016.38
	Public buildings	7	2,203.79
	Restaurant and liquor dispr's.	882	8,505.84
	Sales and display rooms	113	1,112.18
	Stores, department	17	11,534.50
	Stores, retail, miscellaneous	1,066	14,298.22
	Studios	38	376.81
	Theaters	98	8,801.94
	Other commercial	1,659	6,881.77
Subtotal Commercial		6,913	95,052.18
Industrial Processes		146	7,218.34
Industrial Air Conditioning		117	7,883.10
Total Air Conditioning		14,896	117,451.03



CHURCH AIR CONDITIONING leads to increased attendance at services. A storage refrigeration installation serves the Basilica of St. John's church. This view shows the compressor and the refrigeration storage equipment



THESE KING PENGUINS at the St. Louis zoo require exacting temperature regulation and air cleanliness to keep them healthy

control of the home's living and sleeping areas. This arrangement eliminates the longer duct runs a single larger unit would have required, inasmuch as the house is of the spread-out ranch type of construction. The units utilize the outside air and ground coils as heat sources. Each of the two units has its own ground coil and intake and exhaust arrangements for outside air. Heat from the outside air is utilized until the outside temperature reaches a predetermined point, after which the ground coil is switched in automatically as the heat source.

The "Freon 12" coils are of 7/8 in. type L copper tubing, buried 4 ft below the ground surface, with a 3 in. layer of sand above and below the tubing to avoid dead air spaces around the coils caused by lumps in the earth fill (which would reduce heat transfer to the coils.)

The Union Electric Co. of St. Louis believes firmly in the future of the heat pump and expects to see rapid development in commercial applications of such installations.

King Penguins Need Air Conditioning

Many of those attending the ASHVE meeting in St. Louis will recall having seen the display of king penguins at the recent refrigeration and air conditioning show at Navy Pier in Chicago. They are now at the famous St. Louis zoo, to which they and their air conditioned home were presented by John Dube, president of the Alco Valve Co.

These penguins were imported from Europe after having been purchased from a recent Antarctic expedition. In captivity, these "creatures"—they don't look like birds, although they are—are very delicate and require exact temperature regulation and filtered air, in order to prevent the outbreak of fungus diseases to which they are particularly susceptible.

A specially designed refrigerated cage, employing insulating double glazing to prevent condensation and clouding, was designed. It is maintained at a constant temperature of 54 deg. The condensing unit is 1 hp, air cooled, and the evaporator was especially designed with close fin surface and extremely large tube surface for a very close temperature difference between the coil and the leaving air temperature. The refrigerant is "Freon 12", direct expansion to the coil by means of a multi-outlet thermal expansion valve. Special filters were incorporated to maintain the air at a purity of three microns. In addition, ultraviolet sterilizing lamps are installed in the air stream.

It has been possible to touch upon only a few of the applications of air conditioning in St. Louis in an article of this length. The objective has been to indicate that St. Louis is among the leading cities in the adoption of the many benefits resulting from the air conditioning of almost any type of building. The cooperation of S. S. Sansbury, of the Union Electric Co. of Missouri, and the Air Conditioning Council of Greater St. Louis in the development of this article is gratefully acknowledged.

INDUSTRY MUST AVOID COMPLACENCY

THE ELECTRIC INDUSTRY must meet the simultaneous demands of a dual economy — demands of both defense and peace — but this can be done only if the industry fights complacency born of past achievements, according to James H. Jewell, vice president of the Westinghouse Electric Corp., in an address before the Pacific Coast Electric Association at Honolulu.

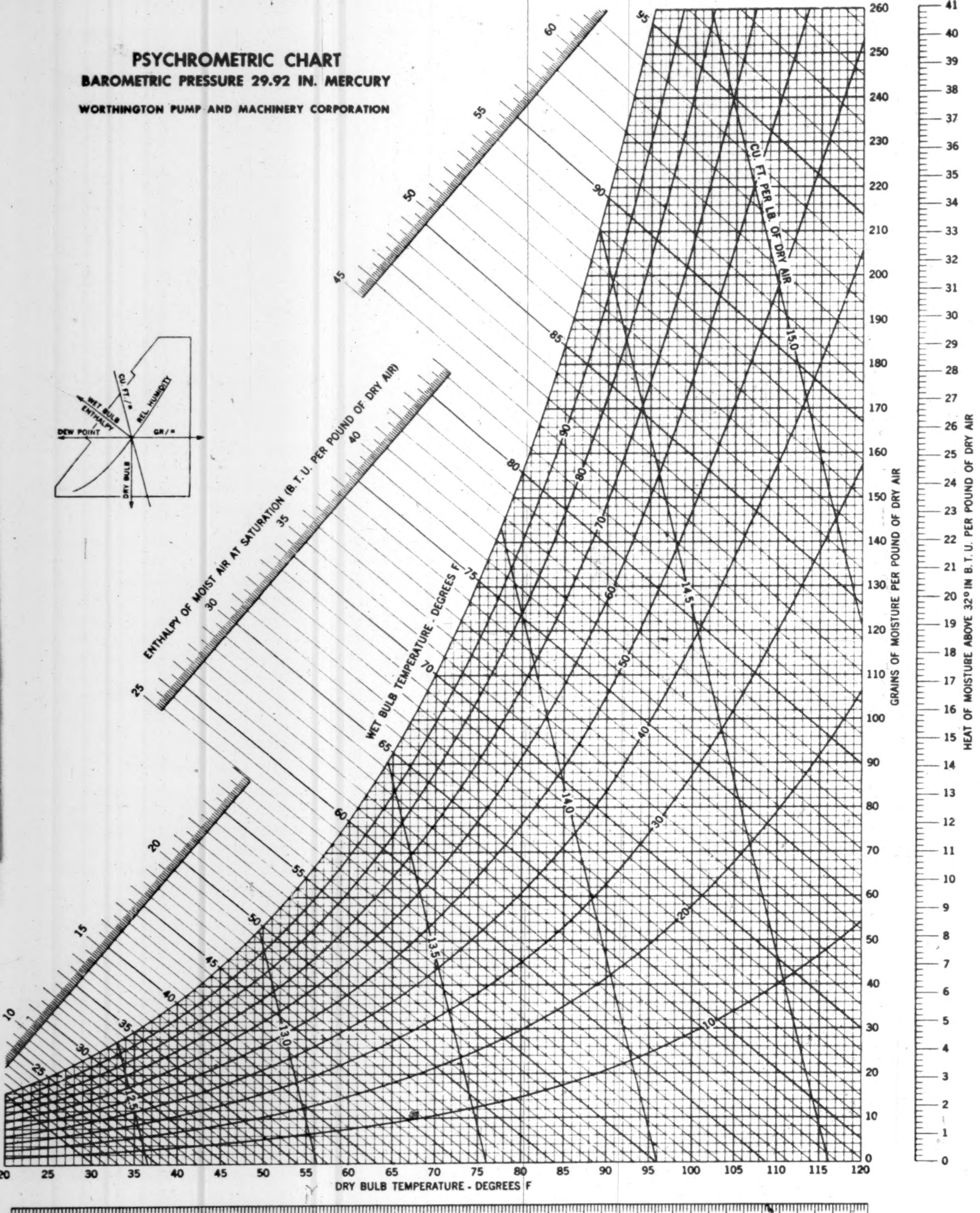
"I have full confidence that we can meet the demands of a dual economy as well as the huge future growth forecast for the industry if we avoid complacency and realize that service to the public is the keystone of our industry and its hope for prosperity," he declared.

"We must return to the aggressive type of sales programs so successful in the past. At the same time the dealer who sells our products direct to the public must improve his service to that public", he said.

PSYCHROMETRIC CHART

BARometric PRESSURE 29.92 IN. MERCURY

WORTHINGTON PUMP AND MACHINERY CORPORATION



Simplifying the Choice of Cooling and Dehumidifying Equipment

Solving Air Conditioning Problems on the Psych Chart

By Melvin A. Ramsey
Contract Engineering Div.
Worthington Pump and Machinery Corp.

MUCH HAS BEEN written on the subject of the solution of air conditioning problems, but there are some parallel line relationships on the psychrometric chart which seem to have been overlooked.

A useful type of psychrometric chart for air conditioning calculations is one on which dry bulb degrees and grains of moisture per pound of dry air are plotted with equal divisions for each degree and for each grain per pound, because many (if not most) of the processes are indicated by lines which are almost exactly straight. Thus, a straight line between two points indicating two air conditions is the locus of all possible mixtures of different proportions of air at each condition. A straight line indicates a given ratio of latent to sensible heat change. A straight line indicates the change of state when air passes over a surface at constant temperature. If the surface temperature is less than the dew point of the air or the surface is maintained wet, the straight line would be drawn from the point indicating the original condition of the air to the point on the saturation curve corresponding to the surface temperature. If the surface temperature is above the dew point and the surface is dry, the straight line indicating the change would be horizontal in the direction of the surface temperature. In any of these cases, the air would reach the condition on the straight line (at the saturation curve or not, depending on the conditions given above) corresponding to the surface temperature if the amount of surface were infinite. This infinite surface might be said to have a contact factor of one or a bypass factor of zero. Depending on the amount of surface and the velocity of the air over it, the contact factor will vary. The greater the surface for a given velocity, the higher the contact factor. The lower the velocity over a given amount of surface, the higher the contact factor. Either contact factor or bypass factor can be used in the discussion as contact factor = 1 — bypass factor. For the actual calculations by the method used in this discussion, contact factor will be used because if bypass factor were used, it would usually appear in the expressions as (1 — bypass factor).

The "contact factor" chart, Fig. 1, shows the effect of face velocity and depth of coil on the contact factor. This chart is general and applies to no particular coil. If the characteristics of a particular coil are known, the amount of exterior surface per sq ft of face area per row is known. For one standard direct expansion coil, this figure is 15.95; for simplicity 16 will be used. Horizontal lines drawn at 16, 32, 48, 64, 80, 96, 112 and 128 will then give the contact factors for various face velocities for 1, 2, 3, 4, 5, 6, 7 and 8 row coils, respectively.

The *k* values given are approximately correct for sensible heat transfer alone. If the dew point at any time is above the surface temperature over which it is passing, condensation (latent heat transfer) will occur *in addition to* the sensible transfer. Since it is in addition to and does not affect the sensible transfer, the contact factor is not affected by the ratio of latent to sensible heat removal. This statement is at least reasonably true with ratios encountered in the usual air conditioning problem.

The total heat transfer coefficient for the outside surface is equal to the ratio of total heat removal to sensible heat removal, as indicated by the slope of the line representing the change of conditions of the air going through the coil, multiplied by the sensible heat transfer coefficient (the *k* values given in the upper left corner of Fig. 1) for the particular velocity. In other words, if, in some particular case, the latent heat removal were equal to the sensible heat removal, the total heat would be twice the sensible. The total heat film coefficient for, say, 500 fpm face velocity might then be expressed as twice 13.8 or 27.6 Btu per hr per sq ft per F.

As an illustration of contact factor, see Fig. 2. Suppose air with a condition of 100 F and 40 percent RH, (point *a*) passes over a surface at 60 F (point *c* on the saturation curve). The change in the condition of the air would be represented by some portion of line *ac*. If the coil

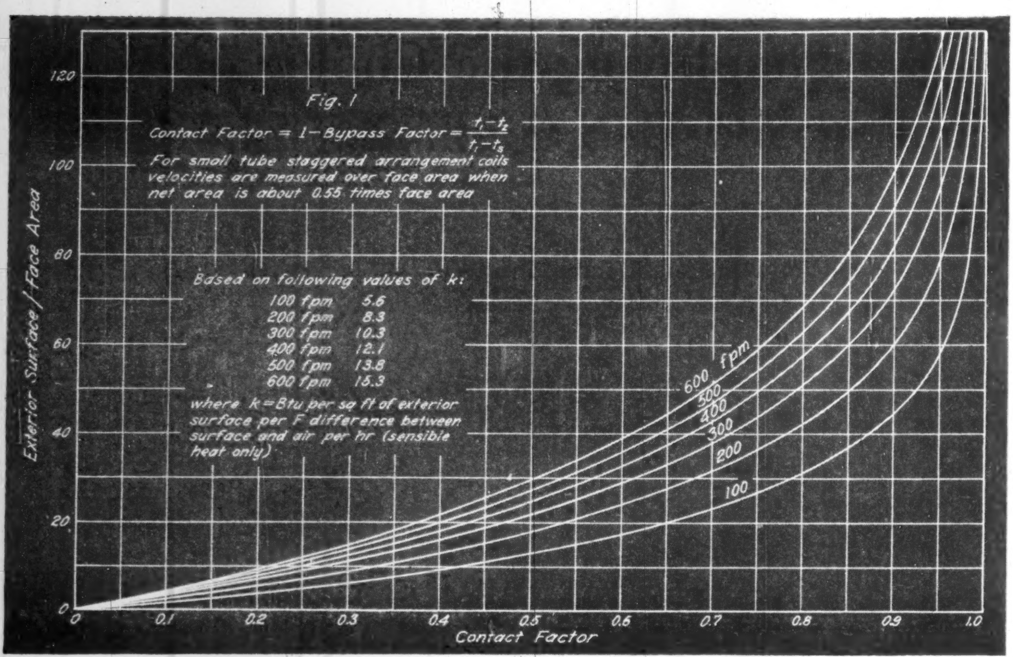


Fig. 1

had an infinite number of rows or the velocity were zero, the air would leave at 60 F saturated. Suppose the number of rows and velocity were such that the contact factor were 0.75. Then the air would leave the coil at the condition represented by point *b*, where $(ab/ac) = 0.75$, or $[(100 - 70)/(100 - 60)] = 0.75$.

If air at 100 F and 20 percent RH (point *d*) passes over a dry surface at 60 F, the change would be represented by line *df*. (If the surface were kept wet or was water sprayed, such as in a washer, it would be a line between *d* and *c*.) With an infinite surface or zero velocity, the leaving conditions would be represented by point *f*. If again, number of rows and velocity are such that the contact factor is 0.75, the coil leaving condition would be represented by point *e*, where $(de/df) = 0.75$.

Actually, the surface over which the air passes is practically never at a constant temperature. In the usual cooling and dehumidifying coil, the first part of the surface (in direction of air flow) is the warmest and the surface temperature gets less for each successive row or part of a row. There are many variations, depending on the method and direction of circulation of the cooling fluid.

To illustrate the effect of a varying surface temperature, suppose the air at 100 F and 40 percent RH passes over a five row coil where the vel-

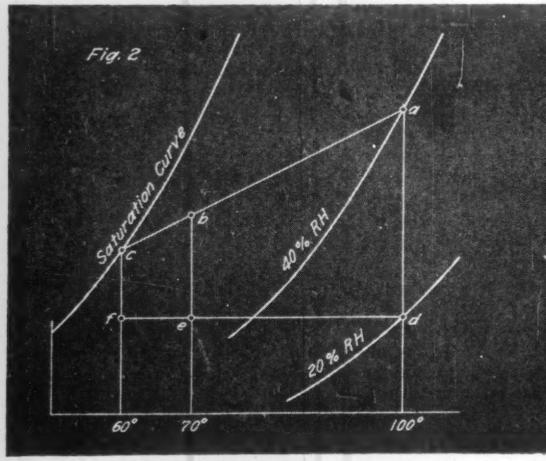


Fig. 2

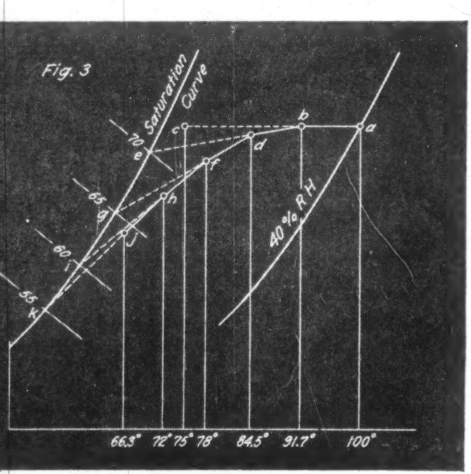


Fig. 3

ocity and surface are such that each row has a contact factor of 0.33. The surface temperatures of the first to fifth rows are respectively 75, 70, 65, 60 and 55 F. Refer to Fig. 3. Line *ac* represents the change for 75 F surface of infinite area. Point *b* represents the air leaving the first row where $(ab/ac) = 0.33$. This is repeated as the air at *b* condition goes to the second row and $(bd/be) = 0.33$, etc., and the air finally leaves the fifth row at a condition represented by point *j*.

Usually this curve is not plotted because it requires rather extensive calculations to determine the surface temperatures. Instead, an approximation is made. If it is desired to have air enter at condition *a* and leave at condition *j*, a straight line is drawn through *a* and *j* and extended to the saturation curve. In this case, the intersection is approximately at 61 F. This 61 F is then called the average surface temperature (the term "apparatus dew point" is sometimes used). The contact factor is then $[(100 - 66.3)/(100 - 61)] = 0.865$, since the temperature at point *j* is about 66.3 F. A coil with this contact factor is then chosen and the inside fluid temperature, etc., must be such as to maintain the 61 F average surface temperature. (This depends on many factors, and methods for obtaining it are given by coil manufacturers.)

Incidentally, the five row coil with a contact factor for each row of 0.33 (bypass factor 0.67), would have an overall bypass factor of 0.67^5 or 0.135, giving an overall contact factor of 0.865. The contact factors for both the fairly close approximation and the rough approximation won't always come out the same, as they do here, but they will be reasonably close.

With this heat transfer and contact factor concept clearly in mind and a good understanding of the psychrometric chart, the calculation of the air conditioning equipment may next be considered and will be discussed in a following article.

[To be continued]

Three New American Standards on Pipe Flanges and Fittings

THREE AMERICAN STANDARDS in the field of pipe flanges and fittings have been approved by the American Standards Association: American Standard Nonmetallic Gaskets for Pipe Flanges, B16.21-1951; American Standard Wrought Copper and Bronze Solder Joint Fittings, B16.22-1951; and American Standard Malleable Iron Screwed Fittings, 150 lb, B16.3-1951.

For the first time, nonmetallic gaskets can now be manufactured and purchased according to American Standard sizes. These gaskets, which are used in almost every large industrial plant in the country, have always been manufactured according to individual specifications. Manufacturer and purchaser have never before had an authoritative set of standard sizes to guide them in producing and buying this equipment.

The new American Standard for Nonmetallic Gaskets for Pipe Flanges covers the types and sizes, material, dimensions and formulas for determining the diameters of gaskets for flanged joints having plain, raised, male, female, and tongue and groove facings. Selection of the proper gasket for the desired type of flange material, pressure rating, and variety of flange is facilitated by presentation in chart form. This chart also contains a reference column listing existing American Standards and standards adopted by the Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) for the various types of flanges covered in the new standard.

The wrought copper and bronze solder joint fittings covered in the new American Standard are used throughout industry for low pressure and low temperature water pipes. This document applies to fittings made of wrought copper or wrought copper alloy material having not less than 83 percent copper content. A table is given showing the pressure ratings for solder used in joints of 50-50 tin-lead, 50-50 tin-antimony or 95-5 lead-tin, and solders melting at or above 1100 F. Dimensions of standard water tubes ranging in size from 1/8 to 4 in. are presented in tabular form. These dimensions cover the outside diameter and length of external connections, and the inside diameter and depth of internal connections, as well as the metal thickness and inside diameter of the fittings. Inspection tolerances on the major water tube dimensions and pipe thread sizes are also given in a separate chart.

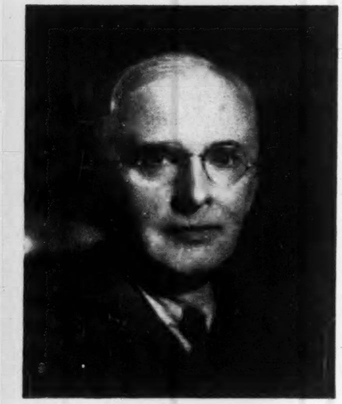
The new American Standard Malleable Iron Screwed Fittings is a revision of the 1939 edition (B16c-1939). The standard was revised to include inspection tolerances on fitting dimensions, an amplified section on threading, and additional sizes in tables covering elbows and crosses (reducing sizes), tees (reducing sizes), couplings (straight and reducing sizes), caps, and return bends.

The 1951 edition gives dimensions of 90 deg elbows, tees, crosses, and 45 deg elbows (straight sizes); 90 deg elbows and crosses (reducing sizes); tees (reducing sizes); 45 deg Y branches (straight sizes); service or street tees and 90 deg and 45 deg elbows (straight sizes); couplings (straight and reducing sizes); caps; and close, medium and open pattern return bends. This standard is a companion document to the recently approved American Standard Malleable Iron Screwed Fittings, 300 lb, B16.19-1951.

A committee organized under ASA procedure and jointly sponsored by the American Society of Mechanical Engineers, the Manufacturers Standardization Society of the Valve and Fittings Industry, and the Heating, Piping, and Air Conditioning Contractors National Association developed these three standards. Copies of the standards will be available from the American Standards Association, 70 E. 45th St., New York 17, and the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N.Y. The prices per copy are: American Standard Wrought Copper and Bronze Solder Joint Fittings, B16.22-1951, 75c; American Standard Nonmetallic Gaskets for Pipe Flanges, B16.21-1951, 60c; American Standard Malleable Iron Screwed Fittings, 150 lb, $1.00.

SAM LEWIS' PAGE

Criticizes Use of Terms "Wet Heat" and "Dry Heat"



SAMUEL R. LEWIS, consulting mechanical engineer and a member of HPAC's board of consulting and contributing editors, comments here informally each month on practical heating, piping and air conditioning problems . . . . . and sometimes on other matters as well

I ATTENDED RECENTLY a meeting of an engineering society at which two talks were given on the relative merits of mechanically circulated hot water and mechanically circulated warm air heating systems. The speakers used the words "wet heat" and "dry heat" quite frequently.

I am critical of the apparently inadvertent use of the term "wet heat" for any sort of hot water heat transmitter.

The air within any conventionally heated room is warmed by contact between air and a perfectly dry surface, whether this surface is copper, cast iron, steel, plaster or concrete. If the surface that warms the air is warmer than the air, heat will expand the air. The air does not care whether the surface that warms it has heated water or heated gas, like steam, or a fire burning coal or oil or gas on the other side.

The relative humidity of the room air, as it is warmed and expanded, becomes lower and lower, and by no means can the relative humidity increase unless water vapor is added. Therefore there is no reason for calling hot water heating by the erroneous term "wet heat". My feelings about the use of the term "dry heat" are similar.

I felt critical also because, in considering the virtues of his particular method, neither speaker discussed the efficiencies of combustion and of heat transfer from the fire to the heat carrier or transporter. The temperature differences between the fire and the water around the fire in a boiler, and between the fire and the average air that is forced around a warm air furnace, are not the same, and should, I think, be considered in a comparison of the two methods of heating.

I endorse heartily the advocacy of continuous operation of the blower that induces air circulation with the warm air furnace system, and which was discussed at this same meeting. The time-honored prescription for a thermostat in the furnace bonnet to start the fan as soon as the bonnet — following another heat sensitive control for the fire — is brought up to some temperature is out-moded and should be out-moded. The history of the old cycle is for little or no air circulation to be in effect through the ducts until the fan starts; then a blast of comparatively hot air follows, gradually cooling until the bonnet thermostat stops the fan. This basic control is for varying volume and nearly constant temperature, and results are usually erratic and far from satisfactory, in my experience.

Varying Temperature, Constant Volume

A better scheme — and one now widely used — is to control the warm air heating system at varying temperature and constant volume.

This method of heating control is old in connection with school building heating and ventilating. Its cost is somewhat higher than that of the bonnet thermostat scheme, but the results are better, in my opinion.

Each important room or orientation zone has a separate air supply branch and receives air part of which may be at 135 deg or warmer and part of which may be 70 deg or cooler. A bypass or auxiliary air passage around the furnace can be provided. The duct that serves each room may have two interlocked dampers; one opening from the warm air space and one opening from the bypass space. These slowly modulating dampers each respond to a thermostat in the space served by that duct. The fan runs continuously. The fire intensity may respond to a thermostat out-of-doors or to a thermostat in the warm air chamber.

"Hot flashes" in any room are avoided by such a control cycle, and comfort and economy are thereby encouraged.

RELEASES NEW FILM ON BITUMINOUS COAL

A NEW DOCUMENTARY film on coal, *Powering America's Progress*, has been released for general distribution by the Bituminous Coal Institute, a department of the National Coal Association, Southern Building, Washington 5, D. C. Aim of the film (which is 16 mm, in color, and has a running time of 25 minutes) is to show the modern mechanized side of bituminous coal mining, coal preparation, its transportation and its utilization. BCI employed the March of Time to produce the film, and the result is a thoroughly professional job, free of "propaganda", with a high entertainment value in addition to its educational qualities.

The picture took almost a year in the making and — including the cost of the duplicate prints — represents an investment of around $100,000.

The film was shown at several previews last month, ahead of its general release date of January 1.

In a shot pertaining to mine ventilation, the narrator states that six times the weight of air is circulated in a mine as compared to the weight of coal removed.

Timing a Decisive Factor in Attachments and Garnishments

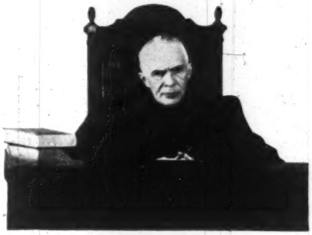
When purchases are made from concerns unlicensed to do business in the buyer's state, attachments and garnishments may present certain difficulties. This is a subject in which *timing* presents a decisive angle when reimbursement for defective equipment is involved. Right up to the minute is the following case.

The Cumfort Heating & Piping Corp. (all names are imaginary) ordered a substantial amount of supplies — guaranteed free of imperfections — from the Reddy Mfg. Co., in another state. These supplies proved to be defective. Cumfort sued Reddy in the courts of his own state to recover for "breach of warranty as to merchandise sold and delivered".

Petitioning for money damages, Cumfort alleged that Reddy was not licensed to do business in Cumfort's state, and asked for "constructive service" of summons on the defendant by publication. This was needed because Reddy was a non-state corporation on which ordinary service of summons could not be made in that state. The summons was issued and in due course returned by the sheriff endorsed "not found".

Cumfort was confronted with a time factor. Reddy possessed assets in the state that might at any moment be moved out of that state's jurisdiction. Hence, the heating and piping concern on the very day of its original petition applied for and obtained an order of attachment "with notice to garnishee." The garnishment notices were served late that day on a supply company and a brass company, both doing business in Cumfort's state and presumably having a common interest with Reddy. These concerns subsequently furnished bond and dropped out as defendants.

That was on January 3. The first publication of the regular notice for "constructive service" did not appear until January 5. Consequently, on February 23, the Reddy Mfg. Co. moved to have the attachment and garnishments set aside and the bond released, giving the apparently plausible reason that the order of attachment and garnishment "was issued before the commencement of the action and therefore was invalid, null and void."



The court overruled this motion. The defendant carried his case to the court of appeals, which sustained the lower court. The supreme court of the state, to which Reddy next appealed, has now sustained the court of appeals. Says the higher tribunal in its closely reasoned opinion:

"An action" — a suit — "shall be deemed to be *commenced* within the meaning" of the statute "as to each defendant, *at date of summons* which is served on him *or* on a codefendant who is a *joint contractor* or otherwise *united in interest* with him. When service by publication is proper, action shall be deemed to be commenced at the date of the first publication, if it be regularly made."

More specifically, the supreme court recapitulates, in this case "plaintiff sought recovery of money from defendant, a 'foreign' corporation not licensed to do business in the state and not immune from attachment". On the same day —

1) A precept for summons upon Reddy was filed and the summons issued.

2) The summonses were returned by the sheriff marked "not found in the county".

3) Affidavits for "constructive service" were duly filed.

A levy of attachment on the defendant manufacturing company's property was neither invalid *nor* premature, the higher court ruled, even though it was made prior to the date of first publication for constructive service.

This decision seems peculiarly significant. The contractor, it indicates, need not wait for service by publication in suing an out-of-the-state manufacturer because of defective materials or for other reasons before attaching that manufacturer's in-the-state assets. He can tie up those assets at the outset — the very day on which he obtains the summons — and at the same time garnishee other firms in the contractor's own state, if the garnisheed firms have a *common interest* with the manufacturer.

[Note: While this discussion applies to an actual case, it should be remembered that legal rules vary in different states.]

William Hurd Hillyer, author of this article, is a contributor to a number of banking and financial publications and has written several books on business. A former vice president of the Atlanta Trust Co., his work there gave him a practical legal background.

PROPOSED LAW WOULD REQUIRE SNOW MELTING

A proposed local law to amend the administrative code of the city of New York which would require the installation of snow melting coils in sidewalks in front of all newly-erected buildings exceeding six stories in height was introduced before the city council by M. J. Stein some months ago. It was referred to the committee on buildings, and remains in committee.

QUESTION OF THE MONTH

How to Exhaust from Diesel Locomotive Shops

WE HAVE A PROBLEM at several of our diesel locomotive repair shops in regard to excessive exhaust gases coming from the engines when run in the shops, wrote H. J. B. in the November HPAC. At one shop, we have exhaust hoods mounted just above the engine outlets, connected to 16 in. stacks with motor-driven roof ventilators, but this method does not appear to be satisfactory, he said.

Information to help in the solution of this problem has been contributed by other of HPAC's readers, and is published here.

DIESEL EXHAUST GAS VOLUMES TO HANDLE

REFERRING TO THE Question of the Month on page 109 of the November HPAC, in which ideas for handling diesel exhaust gases are solicited, such a problem was recently referred to the Army Environmental Health Laboratory by an Army shop. In the course of developing information to serve in solving the problem it was found that data published in Department of the Army *Technical Manual TM 55-27* could be used to estimate roughly the volumes of exhaust gases which would be expected to come from the exhaust pipes of selected types of locomotives. In this manual, the volume of intake air was listed for three diesel engines equipped with turbo-chargers, as shown in Table 1.

TABLE 1—INTAKE AIR VOLUME for diesel engines

Turbine speed	Engine horsepower		
	300	1000	1700
	Volume of intake air at 84 F (cfm)		
Full load	1000	3000	5000
Idling	210	640*	1350

*Idling values given for 1000 hp engine only. Others assumed to be same speed ratio.

TABLE 2—INTAKE AIR VOLUME after heating to 850 F

Turbine speed	Engine horsepower		
	300	1000	1700
	Volume of intake air after heating to 850 F (cfm)		
Full load	2410	7230	12,050
Idling	510	1540	3,240

No data were presented to show the actual volume of exhaust products; however, information presented for the 1000 hp locomotive indicated that the temperature of the exhaust gases after the valves was 850 F. Computations can therefore be made to show the expanded volume of the intake air at these temperatures (Table 2).

From this it could be concluded that a single 16 in. diameter exhaust duct would be large enough for these diesels at idling speeds only. At full load speed, a 27 in. to 33 in. diameter duct would be adequate if the linear velocity of gases in it were maintained between 2000 to 3000 fpm and no air for cooling were taken into the duct. It is quite probable that exhaust gases would frequently be cooler than 850 F at the exhaust outlets. Some average operating value should be worked with.

Satisfactory control of exhaust gases would be most readily accomplished by local exhaust means. This would entail installation of an underfloor or overhead type exhaust system to handle roughly the volumes of gases shown. With this type of control, jacketed diesel exhaust lines or unprotected tubing would have to be provided for connecting exhaust outlets of standing locomotives. These lines would have to be of manageable size or be mounted on counterweight arms to permit easy handling. The stacks into which these lines discharge should have blowers with sufficient capacity to carry the gases out-of-doors.

No data have been developed by this laboratory to show what general ventilation rates would have to be used to dilute these gases to proper proportions. It would probably be a proper assumption that the gases would soon be cooled to the 84 F datum on all days excepting when it was hotter than this. In addition, it would be proper to assume that these volumes would serve as a basis for determining dilution values for supplying air.—C. F. B. (Engineer, Industrial Hygiene, Army Environmental Health Laboratory.)

DROP HOOD OVER THE ENGINE OUTLETS

ASSUMING FIRST THAT all of the exhaust gases pass through the engine exhaust stacks and through no other openings, the problem about handling exhaust gases from diesel locomotive repair shops presented in the November HPAC would not seem to be a difficult one to solve.

The obvious solution would appear to be the one which has been tried at one of the shops — that is, the placing of an exhaust hood over the engine outlets. It was stated in the question that this method had not been satisfactory. I would say that its failure was probably due to one of the following possibilities:

1) Faulty design of hood.
2) Improper location of hood.
3) Inadequate fan exhaust capacity.

I would suggest attaching a hood to the bottom of a tubular section of asbestos material which, in turn, would be attached to the 16 in. stack. (The size of this stack and the capacity of the fan should be checked to make sure that the fan capacity is at least double that of the engine exhaust.) This hood could then be dropped down over the engine outlets. A pulley arrangement would permit the workers to lower the hood over the outlets from the floor level, if desired.

Air passing through the annular area between the exhaust stack and the hood at high velocity should prevent any flow of the exhaust gases out of this area. Since this would be the only point at which the gases could communicate with the shop area, it would seem that no gas could possibly escape into this space.

If possible, it would be desirable to have a straight run of duct following the exhaust hood. This would assure smooth flow past the exhaust stack.

This technique was successfully

used in an air conditioning test setup to make certain that all the output air of a room air conditioner was pulled into a reheater device.—R.L.S.

THREE APPROACHES TO ODOR CONTROL

THIS IS IN REPLY to the question raised in the November HPAC on odor nuisance from diesel shops.

Aside from exhausting the fumes through a stack, which the question states was found to be unsatisfactory, there are three approaches to odor control for diesel exhaust.

First, the exhaust gases, the major irritating constituents of which are aldehydes, may be removed by scrubbing. U. S. Bureau of Mines Report of Investigations 4381, on *Diesel Engines Underground*, by Martin A. Elliott, page 25, describes an inhibited sodium sulfite scrubber which is effective but bulky.

Second, the odors may be adsorbed by specially impregnated activated carbon.

Finally, the irritating fumes may be suitably oxidized by a granular or other oxidation catalyst. The choice between the second and third approaches depends largely on the temperature of the exhaust fumes, and the concentration of adsorbable or combustible irritants.—A. T.

SHOULD WE BURN COAL OR OIL?

If you don't have the answer to one of your problems, chances are someone else does. That's the purpose of this "idea exchange" in each issue, where questions on heating, piping and air conditioning are asked and answered.

You are invited to contribute a question for publication, or an answer to a published question.. Please address your reply to the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

Here's this month's new question. Can you help "J. W."?

"The heating systems in some of the buildings we manage are arranged for firing with either oil or coal, depending upon the current prices of these fuels. We want to adopt some simple method of deciding from time to time which fuel we should use — where we have the choice — for the best heating economy.

"I suppose that perhaps charts are available giving the cost of generating steam with different fuels at various prices. I'd appreciate being referred to such charts, and would be interested in how other plant and building operators determine which of alternative fuels they burn when their plants are equipped to use more than one fuel."—J.W.

Rush Air Conditioning of Big Amphitheatre

NEXT PRESIDENT of the United States won't be nominated by a sweltering delegate like this suffering gentleman, as the International Amphitheatre in Chicago — where both the big conventions are to be held next summer — is now being air conditioned

WHEN IT WAS announced that the Democratic and Republican parties had selected Chicago's International Amphitheatre as the site for their 1952 national conventions it was also announced that the building would be air conditioned—giving the city its first big permanently air conditioned convention hall, as was noted in last month's HPAC.

The air conditioning design is based on maintaining 80 F and 50 percent relative humidity inside the building with an outside temperature of 95 F dry bulb and 75 F wet bulb, and an occupancy of 12,000 people. A roof spray system to reduce solar heat gains is a feature of the design.

The refrigeration machinery being installed will have a total capacity of 1000 tons of refrigeration and is of the centrifugal type, driven by 2300 volt electric motors. Chilled water pumps and a system of piping will circulate the water to the cooling coils of the air conditioning apparatus. The centrifugal refrigeration installation will consist of one 600 ton and one 400 ton machine.

Four fan systems—now serving to heat the tremendous shell-like structure—will be utilized for air conditioning by the addition of cooling coils and filters. Four suspended type air conditioning units are being installed to provide the additional air capacity for the expected heat and moisture loads. The present air distribution duct system will be revamped, with additional air outlets provided to produce effective distribution and circulation of air.

In order to insure the completion of the work in time for the Republican and Democratic conventions next summer, contracts were let promptly to machinery builders and contractors. The conversion of the Amphitheatre to air conditioning will make this building rank as one of the foremost convention and exhibition halls.

A. Epstein and Sons, Inc., Chicago, have been commissioned by the Central Manufacturing District and the Union Stock Yard & Transit Co. to design and direct the air conditioning project. Maurice E. Fine is the air conditioning and refrigeration engineer for the firm. The piping contractor is William A. Pope Co. and the ventilating contractor is Narowetz Heating & Ventilating Co.

Hints on Air Conditioning Trouble-Shooting

By T. A. Williams*

THE MAJORITY OF air conditioning compressor failures are not due to defective compressors or defective parts of the compressor but are due to an external reason such as improper installation, improper maintenance, failure in the control system or some other external cause. This cause must be corrected.

Failures and breakdowns don't just happen. There must be a reason and servicemen must be trained to ask WHY until they find the real reason.

The prime factor in the reduction or elimination of "call back" on service calls is to train servicemen to analyze the cause of failure and correct the real reason for failure rather than just pressing a reset button or replacing the defective part.

The replacement of the defective part without properly analyzing the cause of failure and correcting the real reason for failure quite frequently allows the replaced parts to be damaged in the same manner as the original parts were. The serviceman should be trained to ask

WHY did the valves break?

WHY is the compressor kicking out on the overload relays?

WHY did the hermetic compressor burn out?

WHY did the system slug "Freon"?

WHY did the compressor slug oil?

When a sluggish expansion valve loads a compressor with liquid, breaks valves, or burns out bearings, the serviceman who merely repairs or replaces the compressor and pays no attention to the expansion valve is inviting the same damage to the new compressor.

When the compressor is kicking off on overloads, the serviceman should not install oversized heaters but should determine WHY.

Is the unit getting enough water?

Are the water lines large enough?

Are the belts too tight?

Are the power lines sized large enough?

Is there a loose contact, a defective relay?

Is the system overcharged?

Are the filters dirty?

The serviceman should use a voltmeter and ammeter as well as his other tools to determine the actual trouble.

The voltage and current in all phases of the electrical supply should be checked against the nameplate rating. Readings should be taken at the terminals.

A careful check must be made on the water supply. Readings should be taken of the inlet and outlet temperatures as well as the gpm. These should be checked against the unit specifications and, if possible, against readings taken at the time of installation.

Is the condenser dirty?

Is the strainer dirty?

Are the water lines plugged?

Is it necessary to install some type of water treatment?

In the case of a hermetic compressor failure, the actual cause of failure must be determined. Occasionally a defective oil pump or defective compressor will be the actual cause. However, most failures are due to external causes, such as low voltage, oversized heaters, excessive moisture, excessive slugging and other similar causes. To replace the compressor without determining the actual cause of failure is inviting failure to the replacement.

If the cause of failure is not found, it may be necessary to install the replacement or repaired compressor and run the system to determine what causes the failure.

In the case of a hermetic motor burnout, the "Freon" charge should be evacuated from the system. It is much cheaper to waste a few pounds of refrigerant than to take a chance on any acids or moisture which may have been formed by the motor burning out.

Is the fan section noisy?

Are the pulleys properly aligned?

Have the bearings been properly greased?

Is the unit level?

Has the fan cut-off been properly adjusted?

In the majority of cases the trouble is caused by some simple thing. Altogether too often, the serviceman will start pulling the heads, replacing valves or replacing the compressor without properly analyzing the trouble. This runs up service charges, causes call backs on service calls and, in general, creates customer dissatisfaction with the equipment and the service company. The serviceman must be trained to analyze the trouble and not to make unnecessary repairs.

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*Service Engineer, Worthington Pump and Machinery Corp. Taken by permission from the *Climate Chart*.

Heating, Piping & Air Conditioning

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

JOURNAL SECTION

Self-Charging Electrostatic Air Filters

By W. T. Van Orman* and H. A. Endres, Akron, Ohio**

SUMMARY—When subjected to an air stream, certain plastics, resins, and waxes develop an electrostatic charge of sufficient magnitude to attract and retain particles of dust, smoke, soot and other dispersed solids from the atmosphere. When prepared in suitable form such electrostatic materials serve as effective self-charging electrical precipitators.

Air filters made of porous masses of these materials will remove dust and carbonaceous smoke particles from the air when employed in heating and ventilating systems. Such filters are economical and easily cleaned. Atmospheric humidity within the normal ranges has very little effect on their efficiency.

The effectiveness of these filters has been established by extensive laboratory tests employing a new method of evaluation and has been demonstrated by numerous test installations in heating and ventilating systems.

THE WELL-KNOWN principle of electrical precipitation has been utilized for the efficient removal of highly dispersed particulate matter from atmospheric air. The precipitation results from two forces: (1) electrostatic attraction, and (2) ionic bombardment of the electric wind created by the corona discharge.[1]

Certain high dielectric plastics, resins, and waxes have the property of generating an electrostatic charge under the influence of an air stream. Because of this they will attract and retain fine dust particles from the air by electrostatic precipitation. Among the materials that have been found to exhibit this phenomenon are those which can be formed into thin films by calendering, extrusion, or casting from solution and then shredded to form a porous mass. They can also be extruded and drawn into filaments or fibers similar in size and shape to the glass fibers employed in air filters. Materials which cannot be readily obtained in film or fiber form, such as some of the plastics and the various waxes and resins, can be coated, from solution or dispersion, on a porous or fibrous material such as glass, vegetable or animal fibers, and shredded paper, to impart electrostatic properties to the type of filter masses presently employed in air filters.

The materials listed in Table 1 have been observed to have the property of collecting dust from the atmosphere by electrostatic attraction to a greater or lesser degree.

The manufacturers of plastics have suffered from the natural tendencies of many plastics to gather dust. This tendency appears to be proportional to the surface resistivities according to Von Hippel.[2]

In the case of polystyrene wall tile, great effort has been directed to re-

Table 1—Materials capable of collecting dust from atmosphere by electrostatic attraction

Rubber hydrochloride
Cyclized rubber
Chlorinated rubber
Polyisobutylene
Polyacrylonitrile
Vinyl chloride polymers
  & copolymers

Vinylidene chloride polymers
  & copolymers
Cellulose nitrate
Cellulose acetate
Regenerated cellulose
Polyamide resins
Polyethylene
Polystyrene

Fluorinated ethylene polymers
Methyl methacrylate
Ethyl cellulose
Melamine resins
Urea resins
Phenolic resins
Natural resins
Waxes

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[1] Exponent numerals refer to Bibliography.

For presentation at the 58th Annual Meeting of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, St. Louis, Mo., January 1952.

moving the inherent static charges. The authors' experience in processing polyethylene film indicated an intense dust-gathering ability which necessitated immediate wrapping of the material to avoid objectionable contamination from atmospheric dust. The dust pickup observed was so marked that it led to a patent conception. The character of the inherent charges on polystyrene is very capably described by P. C. Woodland and E. E. Ziegler[2] who show that areas of positive and negative charges exist in close proximity with a branching dendritic character. They found that dust particles themselves, including those consisting of finely divided carbon black, sifted Pocahontas ash, short wool fibers, short rayon fibers, and natural house dust, appear to be equally attracted by positive or negative charges. Areas having static charges of a relatively mild nature are almost sure to collect dust in some form, whereas very strong positive and negative charges existing in close proximity are sure to have unusual and well-patterned dust deposits. It will be noted in Table 2 that both polystyrene and polyethylene are excellent dust collectors as measured by their surface resistivity.

In addition to the initial residual charges on the surface of plastics, the passage of air currents enhances these charges to a higher value and consequently, voltages as high as −1200 volts have been noted on tensilized rubber hydrochloride and +300 to −200 volts on polyethylene.

Since air filters embodying the use of such materials do not require a source of electrical energy as such in order to function as electrostatic precipitators of atmospheric dusts, they are properly considered *self-charging*.

The materials that are most suitable for use in self-charging electrostatic air filters develop both positively and negatively charged areas in the same mass and will, therefore, attract and retain both types of charged particles.

Effect of Humidity

Many electrostatic materials will collect dust even under conditions of high humidity. In Table 2 the surface resistivity is shown at 30, 60 and 90 percent RH, and it will be noted that polystyrene does not drop off in resistivity under increased humidity conditions while polyethylene falls off to only a slight extent. Richard Weber[3] points out that another important characteristic of polystyrene is its insensitivity toward water vapor and that, even when subjected to a considerable charge of water vapor, the filter loses scarcely any of its effectiveness. In electrostatic experiments using polystyrene, A. Flammersfeld[3] has shown that moisture has but little influence.

A daily laboratory weight test on a full scale filter did not show any decrease in weight pick up of atmospheric dust due to high humidity conditions. On a 10,000 mile railroad-car test, where three-fourths of the mileage was run on rainy or damp days, the filters were found to give very satisfactory performance as shown in Table 3. Filter F, listed in Table 3, as well as filters A to E, used in tests, are described in Table 4.

Table 2—Surface Resistivity of Plastics[a]

Plastic material	At 30% RH[b]	At 60% RH	At 90% RH	Remarks
	Ohms	Ohms	Ohms	
Polystyrene	>5 x 10^{16}	>5 x 10^{16}	>5 x 10^{16}	Known to be 10^{19} to 10^{21}
Polyethylene	>5 x 10^{16}	>5 x 10^{16}	3 x 10^{10}	Known to be lower than polystyrene
Polymethyl methacrylate	>5 x 10^{16}	>5 x 10^{16}	7 x 10^{15}	Known to be lower than polystyrene
Ethylcellulose	>5 x 10^{16}	>5 x 10^{16}	3 x 10^{15}	Usually considered lower than methacrylate or polyethylene; dependent upon plasticizer
Vinyl-vinylidene chloride copolymer	>5 x 10^{16}	3 x 10^{15}	2 x 10^{11}	
Polyamide resin	>5 x 10^{16}	10^{14}	10^{13}	
Melamine resin	4 x 10^{15}	10^{14}	10^{13}	
Phenol-formaldehyde	7 x 10^{14}	5 x 10^{14}	2 x 10^{13}	
Paper	3 x 10^{13}	10^{11}	3 x 10^{9}	

[a]According to Von Hippel.[2] [b]RH = Relative Humidity.

Table 3—Dust removed by dinette lounge car filter[4]

Assembly Mileage		I 4,000	II 10,000	II 4,000	I 10,000
Direction of air flow		Up	Up	Down	Down
Filter F 2 in. thick	oz	0	0	½	1
Electrostatic 1 in. thick	oz	½	4	¼	3
Electrostatic 1 in. thick	oz	½	5¼	¾	4½
Total Removed	oz	1	9¼	1½	8½
		Percent of Total Removed			
By Filter F	%	0	0	33-1/3	11.7
By Electrostatic	%	100	100	66-2/3	88.3
Direction		Up	Up	Down	Down

In a complete season's run in homes, about 100 test filters were in no way adversely affected by high humidity. Therefore, if the proper materials are selected, moisture is not a problem with the self-charging electrostatic filters.

It has been found, however, that dielectric materials which contain polar groups, such as rubber chloride and hydrochloride, cellulose acetate and nitrate, tend to be sensitive to high atmospheric humidity and either do not build up a sufficient electrostatic charge, or the charge developed is rapidly dissipated. The net result is that such materials are not effective electrostatic dust precipitators under conditions of high humidity.

Table 4—Filter types used in tests

Filter A	1 in. Glass fiber oil coated
Filter B	1 in. Metal impingement — oil coated
Filter C	1 in. Shredded aluminum — dry
Filter D	2 in. Plastic — dry
Filter E	4 in. Metal impingement — oil coated
Filter F	2 in. Metal impingement — oil coated
Electrostatic	1 in. Shredded polyethylene

Effect of Radioactive Materials

Radioactive materials such as polonium, which emit rays that ionize the atmosphere and produce electromagnetic effects, will discharge the electrostatic filters and render them ineffective.

Testing and Evaluation of Air Filters

The procedure usually employed for testing and evaluating air filters consists of drawing air through a specimen filter at a predetermined rate, the air having been previously impregnated with a so-called *standard* test dust, and determining the quantity of dust removed. The fundamental deficiency of this method of evaluation is that the dust used is not representative of a normal city atmosphere inasmuch as it does not contain *highly dispersed* carbonaceous matter. It is the finely divided carbon present in the air in the form of soot and smoke that is responsible for most of the soiling of walls and furnishings in homes, offices, stores and other buildings. These highly dispersed and electrically charged carbon particles become deposited on such surfaces by thermal or electrostatic precipitation,[5] causing a considerable economic loss in cleaning and redecorating expense.

The carbonaceous smoke particles present in a normal city atmosphere stay dispersed for long periods of time and are carried long distances by the normal movement of the air because of their small particle sizes low apparent density and the electrical charges which they carry. In general, smokes are characterized by particle sizes below 0.5 microns. Some of the particles may be positively charged and others negatively, depending upon the material of which they are composed and also on the manner of formation.[1]

Electrical charges in aerosols may be produced by friction of the particles rubbing together, by friction with the air, or by the action of an ionizing agent such as ultraviolet rays, ionic discharge from high-tension wires, or atmospheric disturbances. Because of these factors such particles are difficult to remove from the air by conventional filtration processes without employing a medium with undesirable air flow resistance characteristics at the velocities normally required in heating and ventilating systems. Furthermore, the amount of power required to force air through a filter with sufficiently small pore size to remove highly dispersed carbon smoke is greatly in excess of that normally available in such systems.

Tests with Atmospheric Dust

The simplest and most convincing demonstration of the effectiveness of the self-charging electrostatic air filter is to use it in series with a conventional impingement type filter in a heating, ventilating or air conditioning system. When the electrostatic filter is placed downstream from the impingement filter, it collects dust which has passed through the latter. When the position of the filters is reversed, the electrostatic filter leaves practically no dust in the air stream that is retainable by the impingement filter and the latter remains substantially clean. This is demonstrated by the tests to be described.

We chose an Atlas Fadeometer having a standard 20 in. x 20 in. x 1 in. filter and a velocity of 450 fpm for the atmospheric dust test. An electrostatic filter was placed in series with a commercial filter of the impingement type, and a 786 hr run was used as standard. Fig. 1 gives a composite picture of upstream and downstream tests where the air passes though the two filters. It will be noted by comparing the color of Filter A with the new filter, that considerable dust has been picked up on the upstream side. The corresponding downstream electrostatic filter has picked up a considerable quantity of dust showing much dust has passed through Filter A. In the reverse position with the electrostatic filter upstream, considerable dust has been picked up, but Filter A remained substantially clean. This indicates that the electrostatic filter is picking up more dust and finer dust than Filter A. Fig. 2 represents a larger and better view of Filter A and the electrostatic filter showing Filter A in upstream position.

Fig. 3 represents an enlarged view of Fig. 1 with the electrostatic filter upstream and Filter A downstream, showing that essentially no dust passed through the electrostatic filter.

Fig. 4 represents a commercial metal impingement filter, Filter B, located upstream and the electrostatic filter downstream. Here again this view shows that a considerable por-

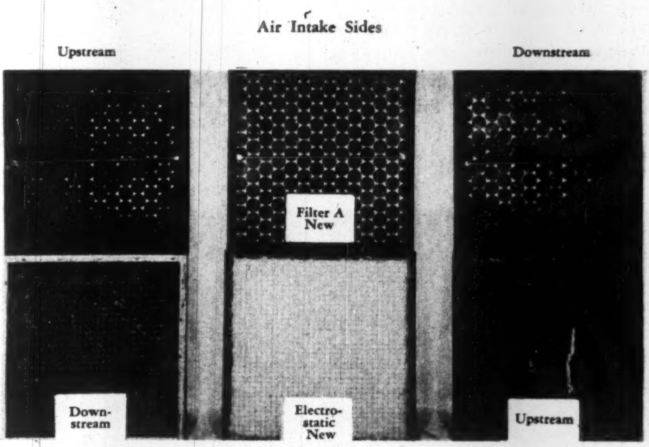
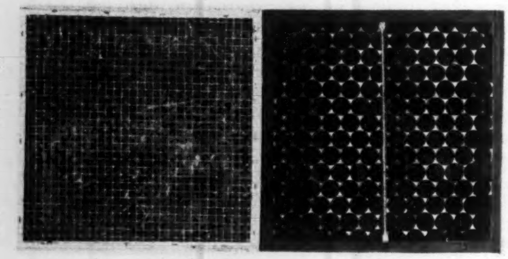


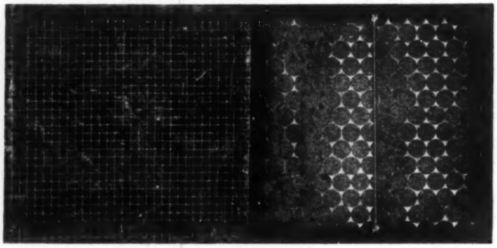
Fig. 1—Effect of position of Filter A and Electrostatic Filter on dust collected (atmospheric dust — 786 hours)



Electrostatic Downstream — Filter A Upstream

Air Intake Sides

Fig. 2—Enlarged view of Fig. 1 showing Filter A upstream after 786 hours — atmospheric dust



Electrostatic Upstream — Filter A Downstream

Air Intake Sides

Fig. 3—Enlarged view of Fig. 1 showing Filter A downstream after 786 hours — atmospheric dust

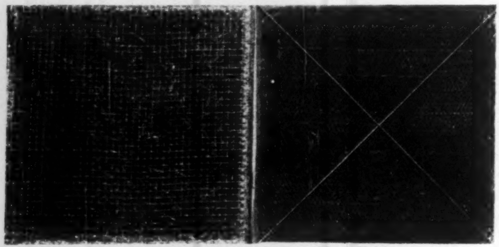
tion of dust has passed through Filter B.

By previous experience it was found unnecessary to reverse the test, since the electrostatic filter upstream would not permit sufficient dust to pass through to discolor Filter B.

In a recent paper, W. J. Smith and E. Stafford[6] point out that there are 5 to 30 million or more individual dust particles per cubic foot in the air we breathe. Any major reduction in the dust count of atmospheric dust will be a major achievement, as has been shown here visually and by comparison with other filters. The authors favor this simple and practical test because it gives a comparison with known makes of filters under actual service conditions even though a month or more is required to complete the tests.

Tests with Generated Smoke

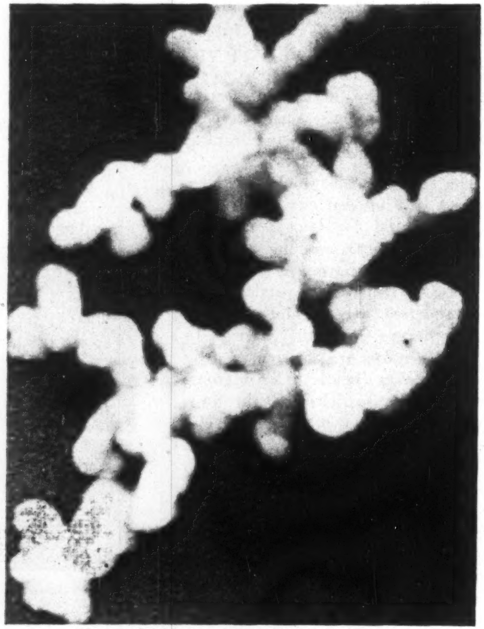
In order to evaluate the various electrostatic materials as practical dust collectors it was desirable to use an accelerated test. The present accepted methods were not considered adequate for this purpose for the reasons previously mentioned. Therefore, it was necessary to develop a procedure involving the use of a highly dispersed carbonaceous smoke in order to approximate the average city atmosphere with which heating and ventilating engineers are normally concerned. This was accomplished by generating in the duct, a constant concentration of carbonaceous smoke under controlled conditions as described in the following paragraph.



Electrostatic Downstream — Filter B Upstream

Air Intake Sides

Fig. 4—Dust collected with Electrostatic Filter downstream and Filter B upstream after 786 hours



The round spheres are 0.05 to 0.1 micron diameter. Three-dimensional impression is achieved by shadow cast by metal at 45 deg. Magnification — 100,000.

Fig. 5—Electron micrograph of smoke particles

Numerous attempts were made to utilize the finest carbon black available as a dust medium, but the re-

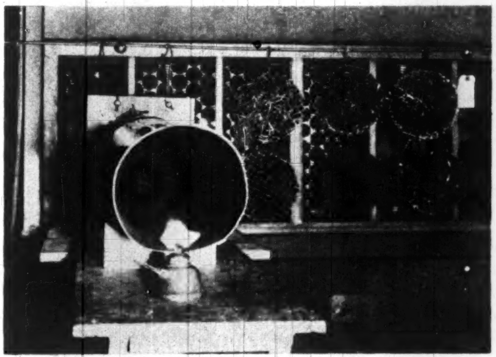


Fig. 6—Weight smoke apparatus — front view

Table 5—Laboratory Filter Test Filter

Material	Grams of smoke retained per 20 grams fuel burned
Polyethylene on glass fiber (fused)	0.348
Polystyrene on glass fiber (latex, fused)	0.335
Polyethylene — shredded	0.261
Polystyrene on glass fiber (solution coated)	0.226
Polyamide resin — fiber	0.213
Paraffined paper — shredded	0.190
Carnauba wax (on paper)	0.182
S-60 (copolymer of styrene and isobutylene) — shredded	0.138
Paraffin on fiber glass (melted)	0.120
Impingement filter B-1 in. metal impingement — oil coated	0.114
Polyvinylidene chloride — shredded	0.079
Candelilla wax (on paper) — shredded	0.075
Filter A — 1 in. glass fiber oil coated	0.065
Filter C — 1 in. shredded aluminum — dry	0.062
Rubber hydrochloride	0.056
Polyethylene (glycerine sprayed)	0.047
Vinyl (vinyl chloride resin) — shredded	0.044
Filter D — 2 in. plastic — dry	0.035

sults obtained were erratic and could not be duplicated. Aspiration, vibration, and screw feed mechanisms failed to give consistent results. The tendency of the particles to agglomerate into relatively large masses renders this material unsuitable as a filter test medium. However, it was found that an aerosol of fine smoke could be generated by burning mixtures of alcohol and benzene under controlled conditions. Alcohol burned with a clear smokeless flame and benzene burned with a very sooty flame. By controlling the proportion of benzene and alcohol it was possible to control the character of the smoke generated. It was found that a mixture of 50 percent alcohol and 50 percent benzene by volume was satisfactory because it gave a definite weighable smoke pickup.

Fig. 5 illustrates the particle size of this smoke, magnified 100,000 times, and showing an initial sphere of carbon 0.05 microns in diameter. It will be noted that these spheres build themselves loosely into chains which are controllable by the rate of combustion, air flow, and wick height. The 0.05 micron particles have enormous surface area, which amounts to approximately 5 acres per lb. This type of carbon has a true specific gravity of 1.75. It is very light and fluffy in bulk, with an apparent density of 0.068, or 4.24 lb per cu ft. Here is a smoke starting with a particle size of 0.05 microns, which is very light and fluffy and more closely approaches the density of atmospheric dust. The outstanding feature of this generated smoke is that the particle size may be increased or decreased as required.

In a paper[7] published in 1948, R. S. Farr, W. N. Pauley, and K. A. Crismon pointed out that the gravity of their recommended test dust of 2.5 was quite high and that particle sizes much smaller than those currently used should be employed to show differences in types of filters.

Richard S. Dill[8] in 1938 pointed out that tests with atmospheric dust and smoke gave uniformly low filter efficiencies. It is equally true today that filter efficiency for smoke is low, and that the time has passed when a mythical 90 percent filter efficiency is accepted.

The authors believe that filter ratings by smoke tests are necessary and desirable to bring out differences in filter performance.

In household service where the air is recirculated as often as 100 times per day it is not necessary to achieve 100 percent actual efficiency. An electrostatic filter will remove a considerable portion of the dust particles on each passage, and after several trips through the filter the air will be essentially clean.

In Fig. 6 the smoke test equipment is shown in front of an air conditioner where test filters are hung in the air stream before and after conditioning. The lamp in the foreground is weighed before and after each test. The wick height is adjusted by gage and the air flow carefully controlled to 300 fpm. Fig. 7 shows the side view of the test equipment. In a two-hour run air velocities are checked every ten minutes and maintained at 300 fpm.

The test filters shown in Fig. 6 are 6¼ in. in diameter by 1 in. in thickness, and are covered on both

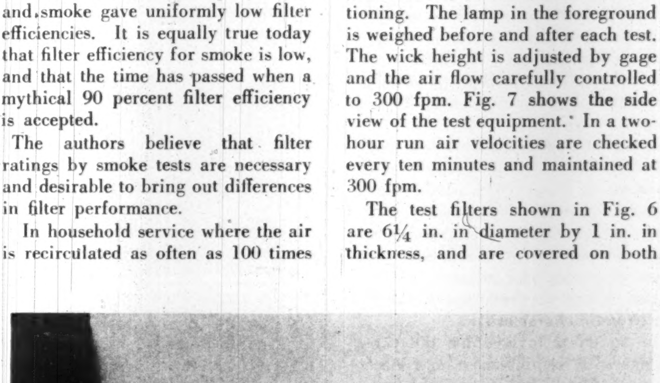
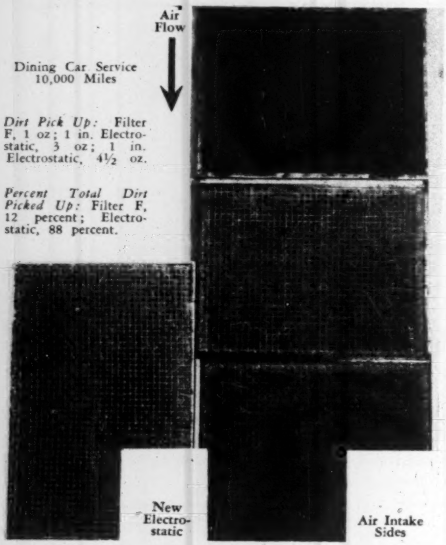


Fig. 7—Weight smoke apparatus — side view

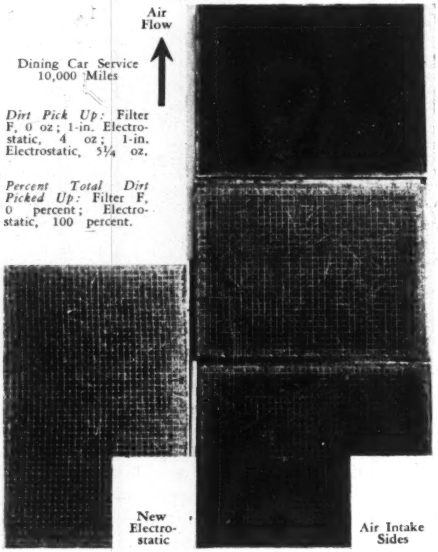


Dining Car Service
10,000 Miles

Dirt Pick Up: Filter F, 1 oz; 1 in. Electrostatic, 3 oz; 1 in. Electrostatic, 4½ oz.

Percent Total Dirt Picked Up: Filter F, 12 percent; Electrostatic, 88 percent.

Fig. 8—Railroad car test combined Filter F (entering side) and Electrostatic Filter



Dining Car Service
10,000 Miles

Dirt Pick Up: Filter F, 0 oz; 1-in. Electrostatic, 4 oz; 1-in. Electrostatic, 5¼ oz.

Percent Total Dirt Picked Up: Filter F, 0 percent; Electrostatic, 100 percent.

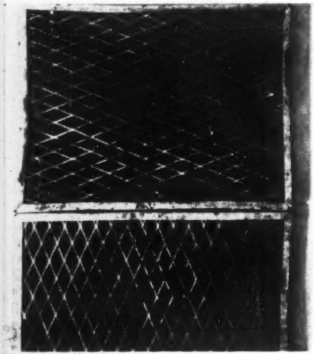
Fig. 9—Railroad car test combined Filter F (entering side) and Electrostatic Filter

sides with two mesh hardware cloth. The entire apparatus is designed for use with an analytical balance sensitive to 1/10 milligrams. Approximately 35 grams of fuel are burned in the two hours. The amount of smoke picked up per 20 grams of fuel used is arbitrarily chosen as the basis of comparison. The ratings of 19 different electrostatic materials and other filters are given in Table 5.

It will be seen that polystyrene and polyethylene are predominantly outstanding in their electrostatic dust pick-up. Superior performance of these two materials is noted when they are applied to fibers, such as glass, vegetable and animal. Rosin coated fibers are reported to have electrostatic characteristics.

In an effort to combine the performance of impingement and electrostatic filters, glycerine was very carefully sprayed on a polyethylene test filter. The smoke pickup was reduced from 0.261 grams to 0.047. The authors interpret these data as indicating that, in a shredded polyethylene filter, 82 percent of the smoke is picked up electrostatically and only 18 percent mechanically.

Emphasis is placed on the fine particle size and high degree of dispersion of the *dust* (smoke) used in this test. Previously reported attempts to use carbon black and other finely divided forms of carbon were of limited success because the dust was present in the air stream in a highly aggregated and agglomerated condition. The effective or real particle size was, therefore, many times that of the ultimate or individual particle size as determined by the accepted particle size measurement methods. It is extremely difficult if not impossible to disperse carbon black or lamp black in an air stream to a degree even approximating the conditions prevailing in an ordinary smoky atmosphere.



Dining Car Service — 10,000 Miles
Dirt Pick Up: One side 3 oz; Other side 4 oz.

Fig. 10—Railroad car test using 4-in. oil coated filters Type E

Service Tests in Heating Systems

In our local area, forty-four homes were equipped with self-charging electrostatic filters. By accident, it happened that the past winter 1950-1951 was the worst encountered in this area in over three decades. In a questionnaire sent out to the users, the question was asked, *Have you noted any difference in the amount of dust in your home?* Replies were: *less dust* 87 percent; *no difference* 7 percent. There was no reply for 6 percent.

Where dust allergies were encountered in the homes equipped with electrostatic filters, a questionnaire revealed that in 75 percent of the cases there was improvement, and in 12½ percent there was no effect. For 12½ percent there was no answer. The general observation was that the electrostatic filters kept the walls, curtains, drapes, and furniture in the homes cleaner.

Railroad Car Tests

Tests were made on a dining car operating between Chicago and Colorado Springs. The impingement filters used in this car were normally 4 in. thick. The test assemblies consisted of two 1 in. electrostatic filters taped to a 2 in. Filter F of metal impingement, oil coated type. Since difficulty would be encountered in trying to judge the relative merits by appearance, each filter of the test assembly was weighed before the start, after 4,000 miles and after 10,000 miles.

The two test assemblies were placed on either side of the car. One assembly was placed with Filter F upstream and two electrostatic filters downstream. On the opposite side of the car the two electrostatic filters were placed upstream and Filter F was downstream. The results, shown in Table 3, indicate that no dust was picked up by Filter F when it was downstream from the electrostatic filters. When Filter F was upstream from the electrostatic filters a very considerable amount of hard-to-catch dust passed through it which was then picked up by the electrostatic filters.

Fig. 8 shows Filter F in the upstream position where it picked up only 12 percent of the total dust collected, whereas the electrostatic filters picked up 88 percent, even though located downstream.

In Fig. 9, where the electrostatic filters were placed upstream, they picked up 100 percent of the dust retained. Blue shredded polyethylene was used in the filters shown in Fig. 8 and 9, and therefore, the color contrast is not as pronounced as exhibited in Fig. 1.

In order to ascertain the dust pick up in the same service at a later date, two 4 in. oil coated impingement filters were tested over the same route and mileage. On one side of the car the filter picked up 3 oz of dust and on the other side 4 oz of dust. Electrostatic filters, only 2 in. in thickness instead of 4 in. collected 9¼ oz of dust. Fig. 10 shows the filters used in this test.

Cleaning Electrostatic Filters

The ease of cleaning electrostatic air filters is worthy of special comment. The directions are to *rinse gently in cold water*. No hot water, no detergent, no re-oiling is needed. Any householder can do the job effectively without additional equipment. After this simple cleaning method, the filters may be drained a few minutes and restored to service even though damp. The filters may be cleaned over and over again without loss of performance.

Conclusions

Air filters composed of electrostatic materials in suitable form offer an economical means of removing highly dispersed carbonaceous particles and other dusts from the air when used in conventional forced draft heating, ventilating and air conditioning systems.

Such filters function by electrostatic attraction and precipitation and are therefore effective throughout their entire thickness. They are easily cleaned by washing with cold water and can be reused without deterioration of their electrostatic properties.

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2. Static Dust Collection on Plastics, by P. C. Woodland and E. E. Ziegler (*Modern Plastics*, May 1951, p. 102).

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7. An Improved Test Method for Rating Air Filters, by R. S. Farr. W. N. Pauley, K. A. Crismon, M.D. (ASHVE Transactions, Vol. 54, 1948, p. 187).

8. A Test Method for Air Filters, by R. S. Dill (ASHVE Transactions, Vol. 44, 1938, p. 379).

For further study of electrostatic filters the following references are suggested.

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10. The Static Electrification of Dust Particles into a Cloud, by W. B. Kunkel (*Journal of Applied Physics*, Vol. 21, No. 8, 1950, pp. 820 to 832).

11. Sonic Precipitation of Smoke, Fumes and Dust Particles, by Melvin Nord (*Chemical Engineering*, Oct. 1950, pp. 116-119).

12. Impregnation of Air Filters with Polystyrene, by Richard Weber (*Zeitung Natuhforsch* 1—1946 pp. 217-219, *Chemical Abstract* No. 41 p. 2281).

13. Filter Patent, by Cecil G. Vokes and Edward A. Stokes (U. S. Patent 2,406,308, 1946, *Patent Gazette*).

14. Filter Patent, by Cecil G. Vokes (British Patent 520,927, 1940, *Chemical Abstract* No. 36, p. 938).

15. Effect of Moisture on Electrical Properties of Insulating Waxes, Resins and Bitumens, by J. A. Lee and H. H. Lowry (*Industrial Engineering Chemistry*, 1927, Vol. 29, p. 304).

R. L. FARMER NAMED TO GENERAL CONTROLS POST

Robert L. Farmer, a member of the Society, recently was appointed factory sales engineer for General Controls Co., Glendale, Calif., according to an announcement by J. F. Ray, vice president in charge of sales. Mr. Farmer, who majored in engineering at Stanford University, will devote his time to sales engineering in the aircraft field. He joined the company in 1943 and recently was attached to the Dallas factory branch office, returning to Glendale in 1951.

R. L. Farmer
Glendale, Calif.

NEW ASHVE STAFF MEMBER

On December 1, David T. Donovan joined the Society's staff at the headquarters 62 Worth St., New York, N.Y., as an assistant to the executive secretary. For the past four years Mr. Donovan has been with Bethlehem Steel Co. at its Lackawanna plant, near Buffalo, N.Y.

David T. Donovan

He majored in the engineering sciences at Harvard University, and was graduated in 1948 with a B.S. degree. He served three years in the Army in meteorology work as a weather observer. Mr. Donovan was born in Lafayette, Ind., and now makes his home in Ramsey, N. J.

WITHERIDGE—KEY CONFERENCE

W. N. Witheridge, ventilation consultant, Research Laboratory Division, General Motors Corp., Detroit, Mich., and a member of the Society, was moderator of the subject, *Air Supply and Exhaust Systems in Laboratories*, presented at a conference on *Laboratory Design for Handling Radioactive Materials*, on November 27 in Washington, D.C. Carleton P. Roberts, of the firm, Voorhees, Walker, Foley, and Smith, presented the subject.

The symposium was sponsored by the *American Institute of Architects* and the Atomic Energy Commission. Other subjects and those making the presentations were: *The Design of Laboratory Facilities for Research with Radioactive Materials at Various Levels*, by Alexander Mackintosh; *Shielding for Various Levels of Radioactivity*, by Dr. Nelson B. Garden; *Surfaces and Finishes for Radioactive Laboratories*, by James G. Terrill; and *Waste Disposal*, by Dr. E. C. Pitzer.

HONORED BY LIFE MEMBERSHIP

GEORGE H. CUMMINS, district manager, Aerofin Corp., Detroit, Mich., has been elected to Life Membership in the Society, according to a recent announcement by the Council.

Mr. Cummins was born in Wheeling, West Va., on December 11, 1886, and was graduated from the University of West Virginia in 1911 with a B.S. in mechanical engineering.

He began his business career by working summers while still a student at Wheeling High School. He served one summer with the Wheeling Mould and Foundry Co., estimating weights and machine time, and another summer with the Baltimore and Ohio Railroad as a helper to a civil engineering corps assigned to bridge and viaduct work.

George H. Cummins
Detroit, Mich.

Following his graduation from the University of West Virginia, Mr. Cummins joined the American Blower Co., under the student training course and was then assigned consecutively to drafting, engineering, and sales engineering on heating and ventilating in the firm's Detroit office. He was with American Blower for approximately two years and then resigned to go with the Morgan-Gerrish Co., Minneapolis, as a sales engineer, in which position he served until joining the United States Army during World War I. During a period of about one year in service, he was chief inspector on both the construction and operation of a Toluol Plant. Upon his discharge from the Army, he rejoined the Morgan-Gerrish Co., and remained with that firm until 1928, when he became connected with the Aerofin Corp. He joined the Society in 1919.

FREDERIC R. ELLIS, superintendent of engineering at Harvard University, Cambridge, Mass., has been elected to Life Membership in the Society, it was announced recently by the Council.

Born December 21, 1886, in Bath, England, Mr. Ellis was graduated from Worcester Polytechnic Institute in 1909 with a B.S. degree in mechanical engineering.

Following his graduation, he joined the B. F. Sturtevant Co., where he subsequently became manager of the heating, ventilating and air conditioning department after having developed the firm's air conditioning division. He resigned from the Sturtevant Co. after 17 years service to join Buerkel and Co., Inc., where he was connected for 15 years before assuming his present position at Harvard in 1942. In this position he supervises the operation of the University's huge steam distribution system and mechanical equipment located in more than 100 buildings around the campus. In addition, he is in charge of all new building design at the school.

Frederic R. Ellis
Hyde Park, Mass.

Mr. Ellis has been a contributor of data on heating and ventilating for the Marks Mechanical Engineering Handbook and also has lectured on these subjects for several years in the Harvard Engineering School.

This paper is the result of research carried on by
THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS
at its Research Laboratory located at
7218 Euclid Ave., Cleveland 3, Ohio

Isothermal Ventilation-Jet Fundamentals

By H. B. Nottage*, J. G. Slaby†, and W. P. Gojsza†,
Cleveland, Ohio

SUMMARY—Data and fundamental interpretations are reported for ventilation jets discharging horizontally into a large confining space. These studies are part of a long-range research program in the fundamentals of room air distribution. Findings for isothermal jets include the following: (1) that outlet velocity has an important influence upon the variation of maximum jet velocity with distance from the outlet, (2) that jet boundaries defined from velocity-vector direction data are easily determined by experiment and are useful analytically, (3) that the total rate of jet momentum flow is not constant, (4) that cross-jet velocity profiles do not fit the simple analytical functions frequently assumed, (5) that the region of negative jet entrainment and ultimate dispersion is important in room-air movement and can be dealt with quantitatively, (6) that the shear-stress distribution within the flow region can be established from the data obtained, thereby providing a helpful fundamental insight concerning the flow phenomena, and (7) that the eddy viscosity can be represented by a simple empirical expression which offers a very useful means for the further development of the theory.

THERE IS a dearth of fundamental data on room air distribution. Needed research[1] has been carefully appraised by the Technical Advisory Committee on Air Distribution‡, and a long-range program has been recommended. Objectives of this general program are: (1) to establish improved engineering design data and fundamental understanding for practical room-air distribution problems, emphasizing the role of buoyant forces arising from non-isothermal conditions, and treating the size and arrangement of the confining space as major variables, (2) to develop instrumentation and techniques for obtaining reliable data, wherever necessary to efficient experimental operation.

Scope of This Report

This paper, one of a series, is limited to fundamental findings from an experimental study of isothermal ventilation jets projected horizontally into a large confining space. The test space, located at the ASHVE Research Laboratory, is shown in Fig. 1. The jet outlet was a 6-in. long-radius *ASME*-standard nozzle. Prime interest was in analyzing the air movement within a confining space, and the outlet was kept unchanged. Test data covered mean outlet velocities ranging from 100 to 6000 fpm, corrected to standard air having a density 0.075 lb per cu ft.

Experimental Procedure

Isothermal conditions were established very carefully, such that the jet and mean-room temperatures always were the same within ±1.5 deg. During the winter, this required a specially sensitive control of the heating system. During the summer, the jet-air temperature was continual-

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*Research Associate, ASHVE Research Laboratory. Member of ASHVE.

†Research Engineer, ASHVE Research Laboratory.

[1] Exponent numerals refer to References.

‡Personnel: G. B. Priester, *chairman;* H. F. Brinen, R. M. Conner, S. H. Downs, Linn Helander, F. B. Holgate, W. O. Huebner, W. W. Kennedy, R. D. Madison, G. E. McElroy, L. G. Miller, H. C. Pierce, C. H. Randolph, T. H. Troller, R. D. Tutt, G. L. Tuve.

For presentation at the 58th Annual Meeting of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, St. Louis, January 1952.

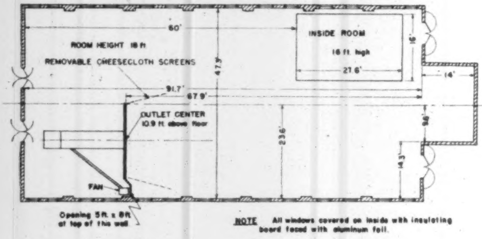
60'
ROOM HEIGHT 16 ft
REMOVABLE CHEESECLOTH SCREENS
47.5'
INSIDE ROOM
16 ft. high
21.6'
16'
14'
91.7'
67.9'
OUTLET CENTER
10.9 ft above floor
23.6'
9.6'
14.3'
FAN
Opening 5 ft. x 8 ft at top of this wall
NOTE All windows covered on inside with insulating board faced with aluminum foil.

Fig. 1—Plan view of air distribution research installation

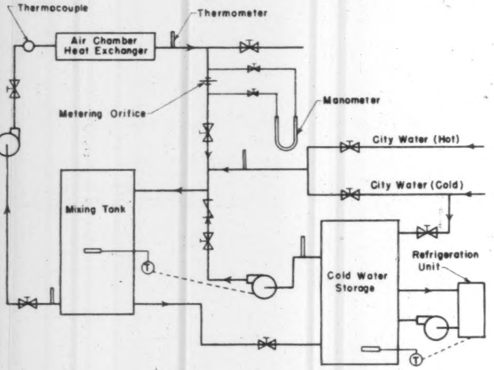
Thermocouple
Thermometer
Air Chamber Heat Exchanger
Metering Orifice
Manometer
City Water (Hot)
City Water (Cold)
Mixing Tank
T
Cold Water Storage
Refrigeration Unit
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Fig. 2—Chilled water circuit for regulation of air supply temperature

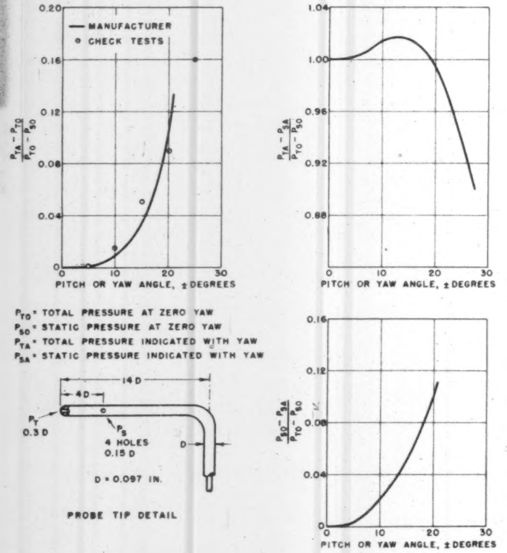
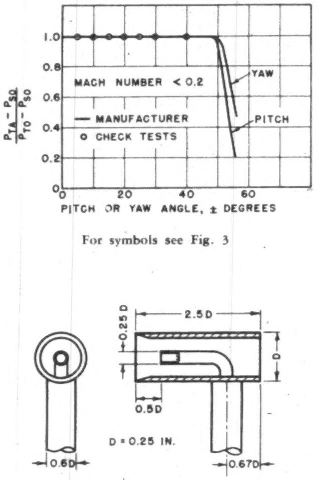


Fig. 3—Tip detail and yaw characteristics for pitot-static probes



For symbols see Fig. 3

Fig. 4—Tip detail and yaw characteristics for Kiel probes

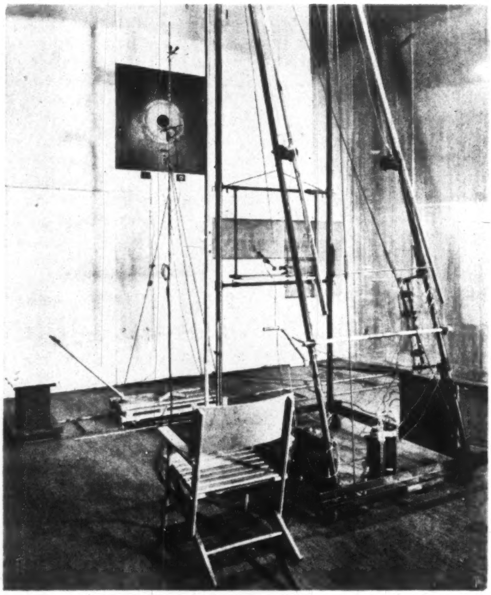


Fig. 5—Equipment used in traversing the flow region

ly adjusted to follow the daily cycle of room-air temperature.

A chilled-water system with a coil in the air supply chamber was used to regulate the jet-air temperature. This is shown in Fig. 2. Combined adjustments of the thermostat in the intermediate water-storage tank and of the water-flow valve were employed, on the basis of experience and judgment, to maintain any desired jet temperature.

Minimizing natural air currents in the test space was very important. Windows were shielded, doors were closed, and room activity was held to a minimum during a test. Reproducible results otherwise could not be obtained.

Once a test condition was established, the entire jet region was traversed very thoroughly to establish the magnitude and direction of the velocity vectors.

Direction data were obtained in two ways. At velocities above roughly 50 fpm, a direction probe was employed, as reported elsewhere.[2] For the lowest velocities, smoke filaments were employed, in a technique which remains to be reported.

Velocity magnitudes were established by the appropriate use of: (1) Pitot tubes, characterized in Fig. 3, (2) Kiel probes, characterized in Fig. 4, and (3) special heated-thermocouple anemometers, described previously.[3]

Traversing equipment is shown in Fig. 5. The stand in the foreground was used for vertical traverses and the pole on the cart in the background for horizontal traverses.

The majority of the velocity data were taken with the anemometers, moving the instruments along a selected path and obtaining a corresponding emf record on an automatic recording potentiometer. Individual traverses were repeated two to eight times to insure reliable averages.

Experimental Results

The first operation was to establish the jet boundaries as summarized in Figs. 6 to 9, inclusive. Boundaries were defined as surfaces of zero velocity component in the direction of the jet axis and were determined from velocity-direction data.

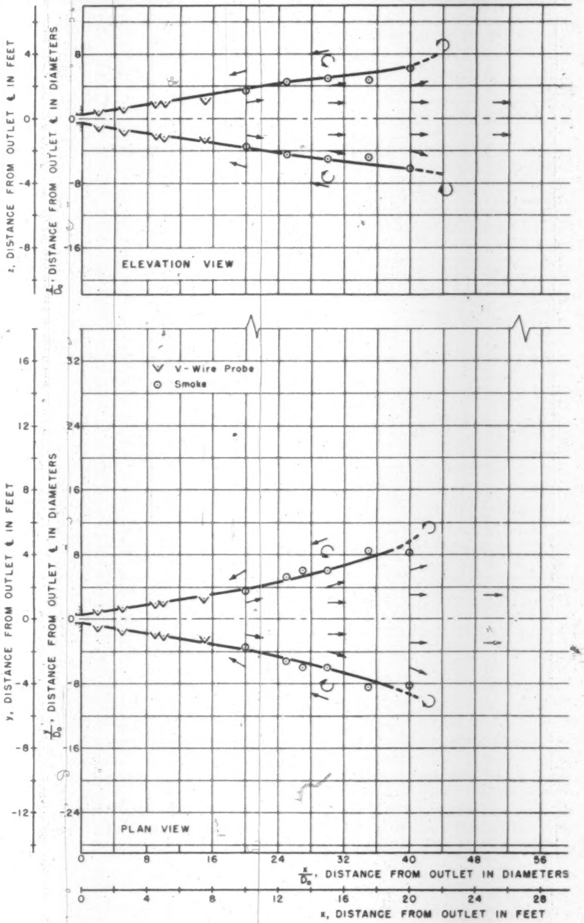


Fig. 6—Plan and elevation views of jet boundaries for an isothermal jet at 100 fpm mean outlet velocity

Cross-jet surveys were conducted to establish the complete boundary contour. In the region near the outlet where the jet expansion was linear, these contours were circles. In the region where the jet was influenced by the confining surfaces, these contours were very closely elliptical, and they were treated as ellipses for purposes of analyzing the flow.

The complete velocity field for each condition was specified in terms of three sets of data, namely: (1) the outlet velocity pattern, (2) the variation of maximum velocity with distance from the outlet, and (3) cross-jet velocity profiles. Figures 10-17 inclusive summarize the data. The abscissa of the profiles is

$$\eta = R/(x + a) \quad \ldots\ldots\ldots\ldots (1)$$

where

R = radial distance from the axis, feet.
x = distance from the outlet, feet.
a = distance of the apparent point source upstream from the outlet, feet.

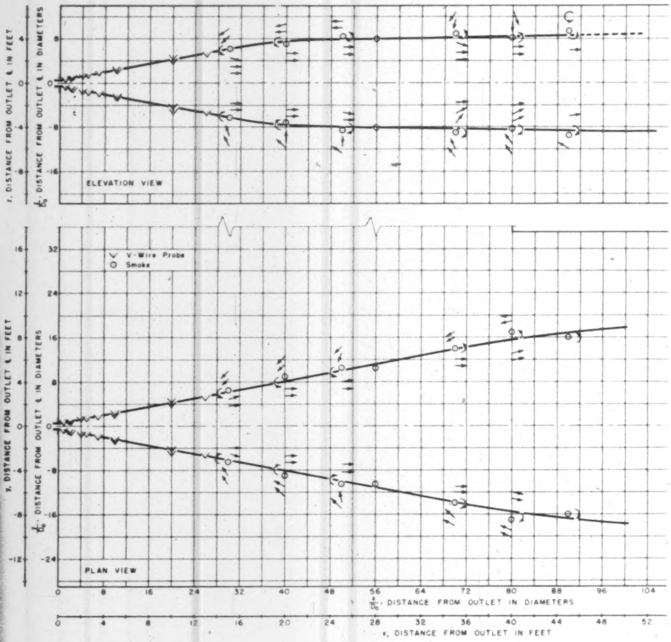


Fig. 7—Plan and elevation views of jet boundaries for an isothermal jet at 350 and 500 fpm mean outlet velocities

The velocities reported in the cross-jet profiles were taken along lines perpendicular to the jet axis, and all velocities are given as components in the axial direction. These components were obtained from measurements of the magnitude and direction of the resultant-velocity vectors.

Magnitudes of a and of the initial jet expansion angle are listed in Table 1.

Calculations

The equations covering the various calculations have been placed in the Appendix. The calculations made are listed in the following:

Jet-Flow Rate. Results are summarized in Fig. 18, where W is the jet-flow rate at distance x from the outlet, and W_o is the outlet flow rate, pounds per minute.

Impulse Force or Momentum-Flow Rate. The total rate of flow of momentum through an area in a fluid stream is equivalent to the so-called momentum impulse

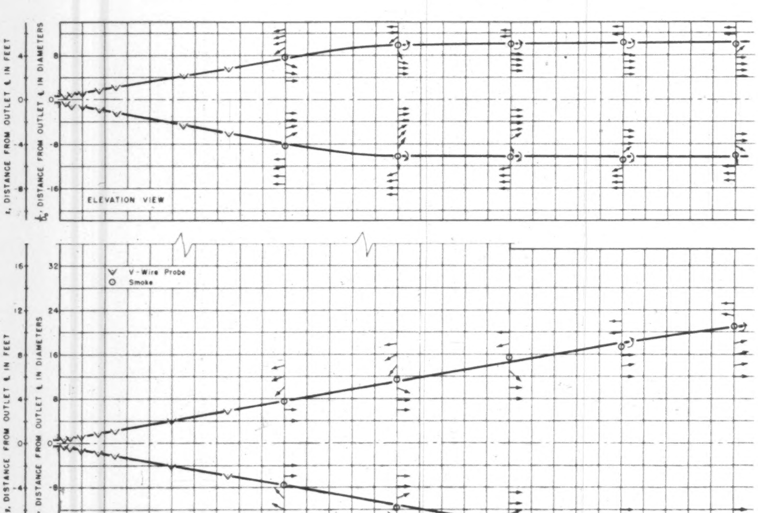


Fig. 8—Plan and elevation views of jet boundaries for an isothermal jet at 1000 fpm mean outlet velocity

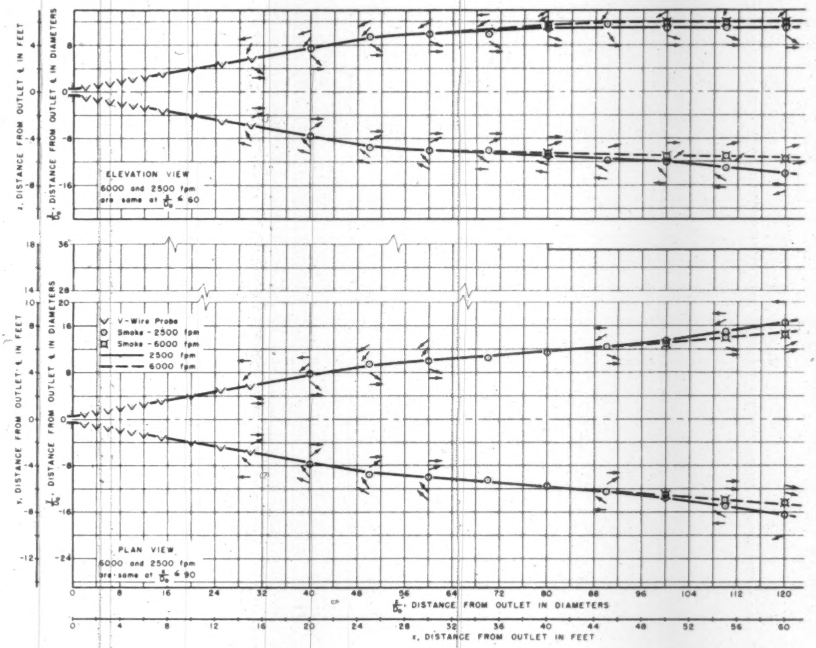


Fig. 9—Plan and elevation views of jet boundaries for an isothermal jet at 6000 and 2500 fpm mean outlet velocities

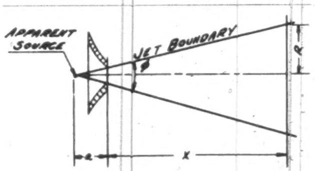
force acting on the area. Determinations are summarized in Fig. 19, where F is the momentum impulse force at distance x and F_o is the outlet momentum impulse force, pounds.

Jet-Boundary Shear Stress. The condition of no external forces acting to oppose the axial motion of the jet corresponds to $F/F_o = 1$ in Fig. 19. This is a customary postulate in jet theory, shown to be of limited validity by the present data. Opposing forces may arise from pressure gradients or shear stresses. Careful study of the present case has established the conclusion that shear dominates. The perimeter-average shear stress opposing the flow is shown in Fig. 20, where τ_b is the axial-direction shear stress on the jet boundary, pounds per square foot, and $(\rho U^2)_{c,x}$ is the momentum impulse force per unit area along the jet axis, pounds per square foot, which will be presented subsequently. For the two lowest outlet velocities, the curves are joined to a computed point at $x/D_o = 0$ for a laminar boundary layer over the nozzle surface.

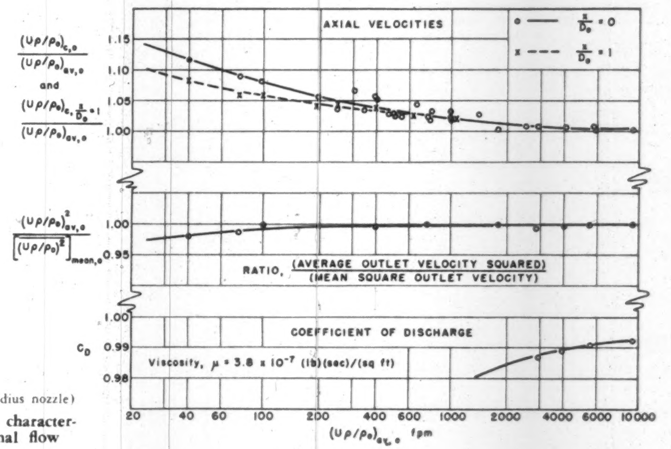
Shear-Stress Profiles. Shear stresses are important for a quantitative appraisal of room-air distribution phenomena. Fig. 21 is a sample of shear-stress profiles com-

Table 1—Jet Expansion Angles and Upstream Distances of the Apparent Point Source

$(U\rho/\rho_o)$avg., o fpm	a/D_o	η_o	Ø, Degrees
100	3.10	0.1623	18.4
350	2.60	.1897	21.5
500	2.60	.1897	21.5
1000	2.85	.1754	19.9
2500	2.90	.1725	19.6
6000	2.90	.1725	19.6



$\eta = R/(x+a) = \text{Tan } Ø/2$
η_o refers to regions of linear jet expansion



(6-in. *ASME* Std. long-radius nozzle)

Fig. 10—Outlet characteristics for isothermal flow

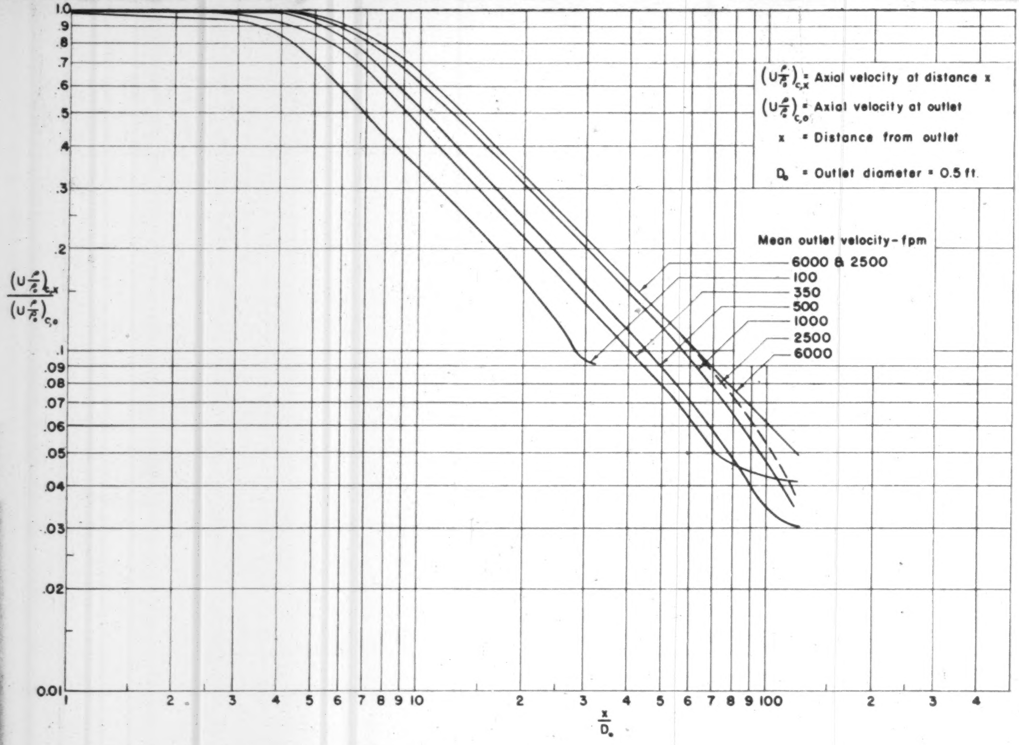


Fig. 11—Axial velocity variations for isothermal jets

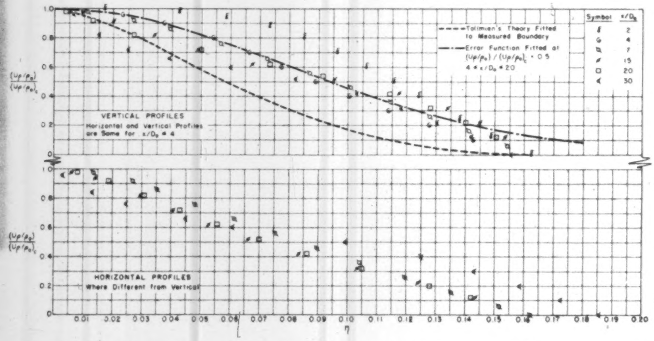


Fig. 12—Experimental velocity profiles for isothermal jet at 100 fpm mean outlet velocity

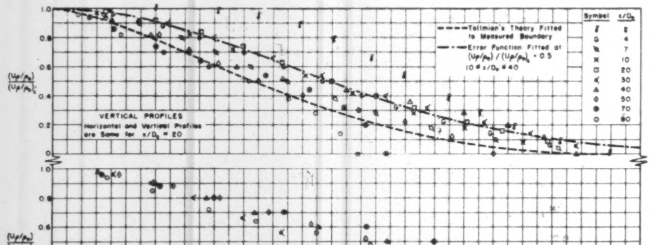


Fig. 13—Experimental velocity profiles for isothermal jet at 350 fpm mean outlet velocity

puted from a combination of theory‡ and the jet-edge shear stresses of Fig. 20. The shear stresses, τ, shown in Fig. 21 result from: (1) the mean-flow rate of momentum transport across surfaces parallel to the jet axis, (2) turbulence, and (3) laminar shear. The mean-flow shear stress is (ρUV), where V is the radial-component mean velocity. The laminar shear is established from the fluid viscosity and the velocity gradient. The turbulent shear is of basic interest as a stress characterized by the prevailing flow conditions, and is to be evaluated only by experiment.

Eddy Viscosity. The eddy viscosity is useful as a means of expressing the turbulent shear stress. Eddy viscosities are computed from Equation 2,

$$\epsilon = [([\tau - \rho UV]/\rho) \div (dU/dR)] - \nu \quad \ldots\ldots\ldots (2)$$

where ϵ is the eddy viscosity in (feet)^2 per second or (feet)^2 per minute, and ν is the kinematic viscosity of the fluid in the same units.

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‡The theory referred to here is the so-called *boundary layer theory* which has been highly developed in aerodynamic analyses. The details are mathematical and it is contemplated that they will be published later, perhaps in a Research Bulletin.

Magnitudes of ε, if representable by a simple empirical formula, are very useful in fundamental mathematical theory. The theory cannot be developed without some means of representing the turbulent shear stress, and ε serves the purpose well.

Fig. 22 shows sample magnitudes of $(\varepsilon + \nu)/\nu_{std}$ where $\nu_{std} = 16.3 \times 10^{-5}$ (ft)^2/(sec), which is representative of test conditions. These data, for 100 and 350 fpm mean outlet velocities, cover only the lower limits of the test work.[15]

The present results for ε have been found to fit the empirical formula,

$$\varepsilon/(U\rho/\rho_o)_{av,o} = 0.542\eta + 79.0\eta^2 - 429 \cdot \eta^3 + \ldots \quad (3)$$

where

ε = eddy viscosity, square feet per second.

$(U\rho/\rho_o)_{av,o}$ = average velocity over the outlet area, fpm

The range for Equation 3 is

$100 \leq (U\rho/\rho_o)_{av,o} \leq 6000$ fpm

$0 \leq \eta \leq 0.14$

$0 < x/D_o <$ limit of axial velocity data in Fig. 11.

There exists a slight and consistent trend of ε with x/D_o which has been neglected in Equation 3. The scatter of the test points about the line of Equation 3 is within ± 15 percent which scatter includes the influence of x/D_o. The fact that the data can be expressed by Equation 3 over such a wide range of test conditions is, in itself, a demonstration that the turbulent-shear phenomena have a regularity of behavior which encourages further experimental and analytical studies.

Discussion and Summary of Results

Flow Behavior

The velocity data reported are best-estimate time-mean quantities. The air movement itself was carefully observed through many hours spent in watching smoke filaments. The flow was locally reproducible only in the statistical sense that most probable time-mean characteristics were evident. The data, however, were thoroughly checked and rechecked to establish the final results presented.

Room-air movement is replete with local eddies, vortices, surges, and back and forth wanderings of particle flow paths. These are manifestations of unbalance in the forces acting within the fluid. These internal forces govern the motion, yet they are extremely delicate. Fig. 23 emphasizes the point, showing magnitudes of the momentum impulse force per unit area along the jet axis, which quantity is also the ordinate

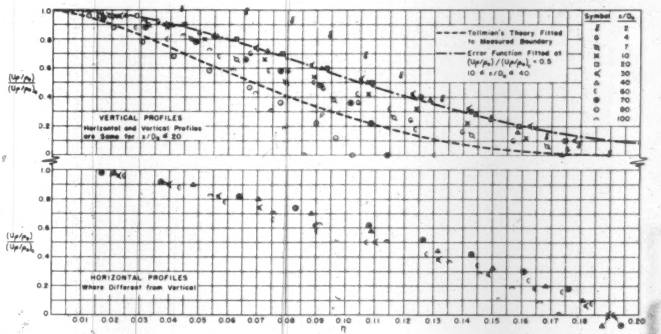


Fig. 14—Experimental velocity profiles for isothermal jet at 500 fpm mean outlet velocity

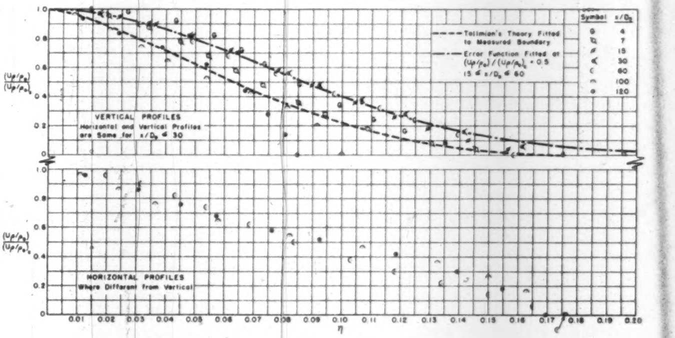


Fig. 15—Experimental velocity profiles for isothermal jet at 1000 fpm mean outlet velocity

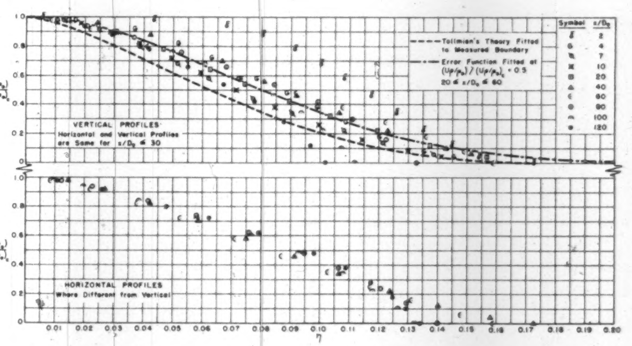


Fig. 16—Experimental velocity profiles for isothermal jet at 2500 fpm mean outlet velocity

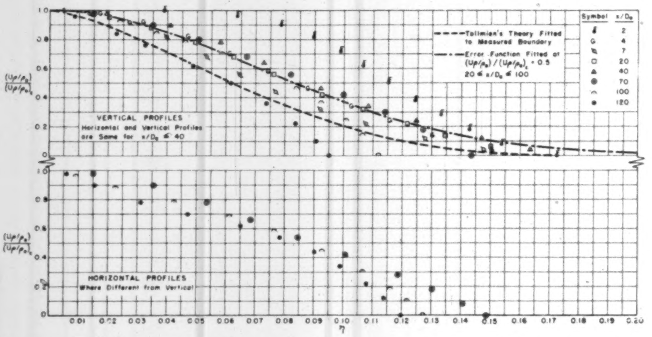


Fig. 17—Experimental velocity profiles for isothermal jet at 6000 fpm mean outlet velocity

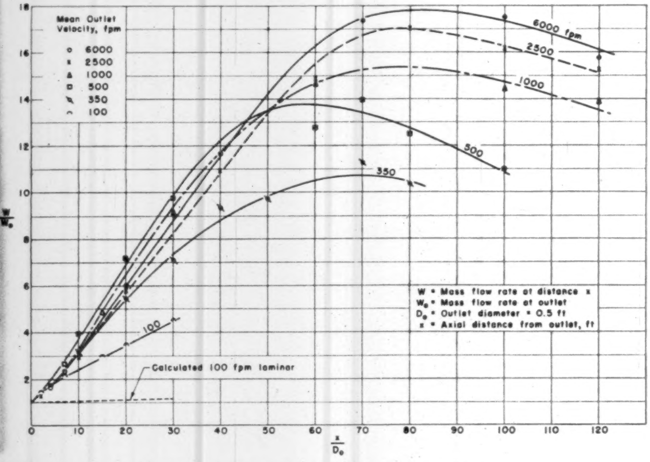


Fig. 18—Flow rate ratios for isothermal jets

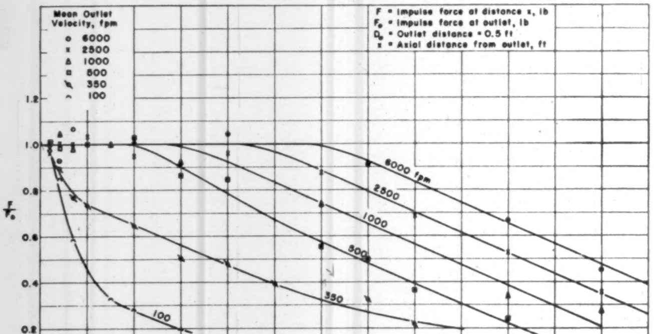


Fig. 19—Axial momentum impulse forces for isothermal jets

denominator in Figs. 20 and 21. Any local influence which produces a disturbing stress of a magnitude which is significant relative to the stresses of Fig. 23 will impede or distort the flow. This sensitive susceptibility to disturbances needs to be carefully appreciated.

Points for practical emphasis are:

1. Air motion in practical room-air distribution cannot be expected to be a smooth streamline flow. Local flow irregularities could influence comfort sensations from exposed skin surfaces and also could be important in convective heat exchange at room surfaces.
2. Field data on air velocities in practical room air distribution may be misleading because of local flow irregularities; *i.e.,* supposed time-mean readings will involve instrument response characteristics which commonly are not known. Also, the nearby presence of an observer or any moving object when field data are being taken is liable to be a source of irregular flow behavior.
3. Velocity data which give only magnitudes are incomplete, for velocity is a vector quantity which has both direction and magnitude.
4. Temperature differences of as low as 2 to 5 deg can produce density-difference stresses which, at low velocities, are significant relative to the other stresses within the fluid and thus can distort the motion. (This remains to be brought out further in future considerations of non-isothermal flow.)

Jet Velocity Field

The complete axial-direction velocity field has been specified in terms of four sets of data, (1) boundary contours, (2) axial velocities and axis positions, (3) outlet characteristics, and (4) cross-jet velocity profiles.

Boundary Contours

The boundary envelope of the jet flow has been established as the surface in space on which the mean-velocity component in the direction of the jet axis is zero. An entrainment velocity, which may be inward or outward, exists in the radial direction over this boundary surface.

The practice of establishing jet-flow contours on the basis of velocity-vector directions is proposed for general practical use.

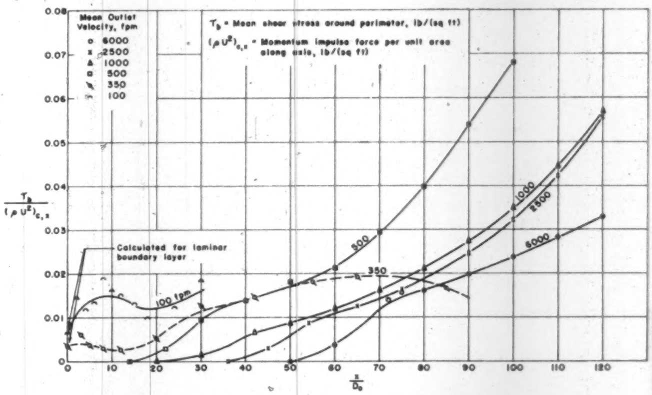
Axial Velocities and Axis Positions

The jet axis was taken as the line of maximum velocity with increasing distance from the outlet. With isothermal flow, the axis was a straight line perpendicular to the center of the outlet plane. If the room ceiling had been closer to the outlet, a straight-line axis would not have been expected.

All quantities in any plane perpendicular to the jet axis have been referred to conditions on the axis. This is believed to aid the condensed and systematic presentation of the data.

The clear influence of the mean outlet velocity upon the axial-velocity variation, as shown in Fig. 11, has not been previously established. This influence is basically tied to the relative change of the stresses acting within the flow. Reference to Fig. 23 keynotes the large stress range involved.

A comparison with representative axial-velocity data from the literature is given as Fig. 24. This lends support to the present results. The general order-of-magnitude agreement for the higher outlet velocities between all experiments indicates that the presence of confining surfaces, within the range covered by the data, has no significant effect upon the axial-velocity variation. This, in particular, is an important practical-application deduction.



(calculated from rate of change of momentum impulse force)

Fig. 20—Boundary shear stress for isothermal jets

Outlet Characteristics

The outlet is important in establishing the initial velocity distribution. The data summarized in Fig. 10 are recommended as the most useful characteristics of the outlet flow. (Including the axial velocity ratio at $x/D_o = 1$ will aid logarithmic plotting as in Fig. 11.) The differences between various outlets could be clearly appraised in terms of the curves given in Fig. 10, and this is suggested for practical-application use. The role of the ordinate ratios of Fig. 10 will be seen when referring to the equations in the Appendix. The discharge coefficient is included for use as might be appropriate in practical problems.

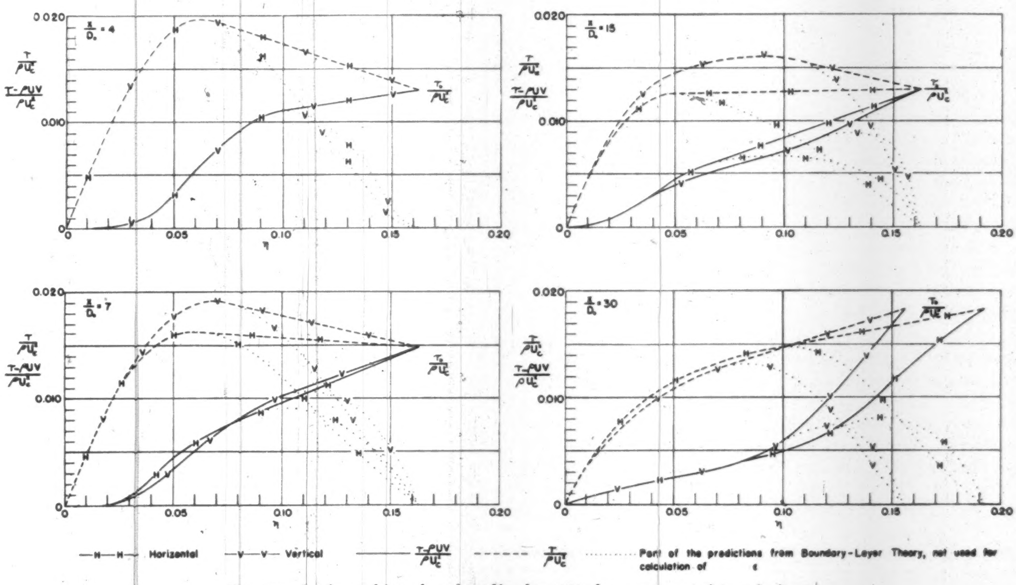


Fig. 21—Isothermal-jet shear profile for 100 fpm mean outlet velocity

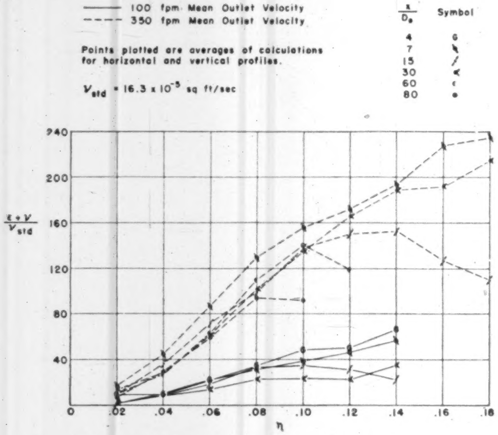


Fig. 22—Eddy viscosity, ε, for isothermal jets

Cross-Jet Velocity Profiles

The test points in Figs. 12-17 are compared with the theoretical profile of Tollmien[4] and also with the error-function profile†, which represent typical assumptions reported in the literature. Neither one is satisfactory in the present case, and the matter of finding a simple analytical expression to fit the test data was abandoned. The experimental profiles were used directly in all calculations. This is emphasized as having been essential to accurate practical interpretations.

In the present tests, the cross-jet profiles were found to be symmetrical about the axis as long as definite jet boundaries existed. This need not have been the case if, for example, the ceiling had been closer to the jet axis.

The profiles were continuous into the reverse-flow region, but quantitative analysis was not attempted beyond the jet boundaries.

In closing these comments on the jet-velocity field, it is to be noted that the data as presented allow the axial-direction velocity to be established for any point within the boundary envelope. With the velocity-direction profiles, which have not been included in this paper for reason of space economy[15], the complete velocity-vector field is defined. This complete coverage of the jet region allows any desired additional calculations or comparisons to be made.

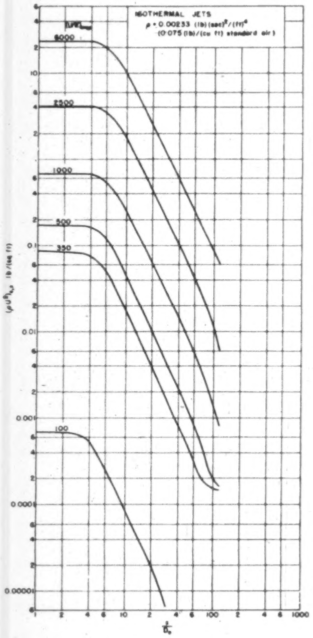


Fig. 23—Magnitudes of $(\rho U^2)_{c,x}$, the momentum impulse force per unit area along the jet axis

Jet Flow Rate

The curves of Fig. 18 are nearly linear up to $x/D_o = 30$. The location of the 6000 fpm line slightly below the 500 fpm line is believed to result from a *starving* of the higher velocity jet by the presence of the room surfaces. The negative entrainment rates are consistent with smoke-filament observations; the actual magnitudes encountered at the higher velocities are believed related to the space configuration. The confining surfaces, however, had no detectable influence at 100 fpm, and only a small effect for 350 and 500 fpm mean outlet velocities. The curve for laminar flow at 100 fpm is shown to indicate a lower limit.

One practical consequence of these results is to show the limitation on the validity of an assumption that the jet flow rate would increase linearly with distance from the outlet.

Perimeter-mean entrainment velocities may be computed[15] from the curves of Fig. 18. Using these entrainment velocities, it can be shown that the difference in static pressure between the jet boundary and a position in the surroundings where the air is at rest is a definite but very small magnitude. The expression for this pressure difference, $\triangle P_B$, pounds per square foot, is

$$\frac{\Delta P_B}{(\rho U^2)_{c,x}} \cong 0.00045 \qquad (4)$$

where $(\rho U^2)_{c,x}$ is the momentum impulse force per unit area along the jet axis, pounds per square foot, from Fig. 23.

Momentum Impulse Force

The results of Fig. 19 discredit the frequent assumption that the momentum impulse force remains constant along a jet trajectory. Changes in the confining surfaces presumably would alter the curves for the higher velocities at roughly $x/D_o > 30$, but, closer to the outlet, the drop in the lower-velocity curves is believed to reflect the action of fluid stresses opposing the motion and largely independent of the size of the surrounding space.

According to theory, a 1:1 slope of the axial-velocity curves of Fig. 11 is predictable for the condition

---

†The equation of the error-function profile is

$$(U\rho/\rho_o)(U\rho/\rho_o)_c = e^{\frac{-\eta^2}{C}}$$

where C is obtained by fitting the curve to the test data. In theory C is twice the mean value of η^2.

$F/F_0 = 1$. The data, however, show very nearly a 1:1 slope with F/F_0 not equal to 1, which is a partial refutation of the theory. A practical observation is that overgeneralization from limited data or approximate theory should be guarded against.

Shear Stresses and Eddy Viscosities

It is strongly recommended that internal fluid stresses be recognized[5] in appraising practical ventilation problems. The present studies merely are a beginning toward quantitative interpretation. The long-range development of confining-surface influence will require many further data and stress evaluations for fundamental understanding.

If $\varepsilon = 0$, the flow is laminar. It is extremely doubtful that laminar movement should prevail throughout a ventilated space. At 100 fpm, for instance, the flow becomes increasingly turbulent in the farther jet regions.

The magnitude of ε relative to the kinematic viscosity, ν, as shown in Fig. 22, is an excellent index of the *strength* of the turbulence. The entire test range contained the extremes of ε being approximately twice ν to ε being 2800 times ν. This is a striking point to be kept in mind.

Equation three for the eddy viscosity supports the thought that turbulence in room air distribution is a consistent physical phenomenon amenable to careful experimental research. Given a means of predicting jet boundaries in connection with empirical relations for the eddy viscosity, then the solution of practical problems will be greatly expedited. *The dominant need is for more data.*

Jet Dispersion

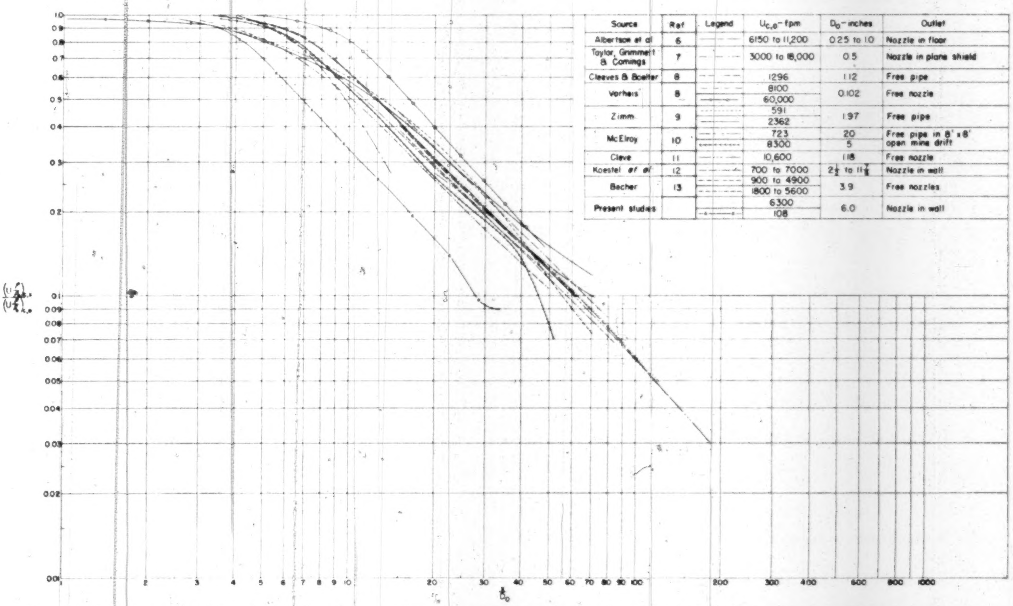
The dispersion of a jet, signified by the disappearance of directed motion, starts with the collapse of an observable jet boundary and then progresses inwardly to the jet axis. Dispersion may be complete within a few feet (4 to 6 ft) if the general spatial air movement is high (25 fpm), or dispersion may require a considerable distance (10 to 20 ft) if the general spatial air movement is low (below 10 fpm). The levelling off of the maximum-velocity curves of Fig. 11 indicates the dispersion region for the present data. For practical problems, it is significant to point out the error which would result from an over-extrapolation of the linear portions of the curves of Fig. 11.

Conclusion

Since this paper is only a brief summary, primarily intended to stimulate an appreciation of physical phenomena rather than to provide direct handbook-style data, it is well to close with a repetition of the research attitude brought forth by Tuve[14] in 1937. Namely, the development of a quantitative engineering understanding of room-air distribution will be greatly aided by continuing experimental research, technique and instrumentation studies, and fundamental data of the present general type in line with the stated general objectives of the long-range program.

Acknowledgment

D. A. Huebscher, formerly Instrument Maker at the ASHVE Research Laboratory, is to be credited with performing a large part of the experimental operations. This paper is based upon part of a thesis submitted



Source	Ref	Legend	$U_{c,o}$ – fpm	D_o – inches	Outlet
Albertson *et al*	6	— — —	6150 to 11,200	0.25 to 1.0	Nozzle in floor
Taylor, Grimmett & Comings	7	— · — ·	3000 to 18,000	0.5	Nozzle in plane shield
Cleeves & Boelter	8	- - — - -	1296	1.12	Free pipe
Vorheis	8	- - - -	8100	0.102	Free nozzle
		—•—	60,000		
Zimm	9	······	591	1.97	Free pipe
		——	2362		
McElroy	10	— · —	723	20	Free pipe in 8' x 8' open mine drift
		······	8300	5	
Cleve	11	— ·· —	10,600	1.18	Free nozzle
Koestel *et al*	12	— — —	700 to 7000	$2\frac{1}{2}$ to $11\frac{7}{8}$	Nozzle in wall
Becher	13	- - - -	900 to 4900	3.9	Free nozzles
		- - · - -	1800 to 5600		
Present studies			6300	6.0	Nozzle in wall
		-•——•-	108		

Fig. 24—Summary of axial velocity data from various experimenters for isothermal air jets from round nozzle or pipe outlets

to the Graduate Faculty of Case Institute of Technology by the senior author; the guidance of Professors G. L. Tuve, S. D. Black, and L. G. Seigel is gratefully acknowledged.

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12. Comparative Study of Ventilating Jets from Various Types of Outlets, by Alfred Koestel, Philip Hermann and G. L. Tuve (ASHVE Journal Section, *Heating, Piping & Air Conditioning*, Vol. 22, July 1950, p. 113.)

13. Calculation of Jets and Inlets in Ventilation, by P. Becher (Kommission Hos Jul. Gjellerups Forlag, Copenhagen, 1949.)

14. Measuring Air Distribution and Grille Performance in Air Conditioning, by G. L. Tuve (ASHVE Journal Section, *Heating, Piping & Air Conditioning*, Vol. 9, November 1937, p. 700.)

15. It is contemplated that tabular summaries of the entire data will be published later in a more complete report, perhaps a Research Bulletin. Pending such release, ASHVE members may obtain copies of the tabulated data by applying to the ASHVE Research Laboratory.

APPENDIX

Calculation Formula

All of the integrations were performed graphically.

1. Jet-Flow Rate

$$\frac{W}{W_o}=\left(\frac{x+a}{R_o}\right)^2\frac{(\rho U)_{c,o}}{(\rho U)_{av,o}}\,\frac{(\rho U)_{c,x}}{(\rho U)_{c,o}}\int_0^1 \eta_v\,\eta_h\,\frac{d(\rho U)}{(\rho U)_{c,x}}\;\cdots\cdots\text{(A-1)}$$

2. Momentum-Impulse Force or Momentum-Flow Rate

$$\frac{F}{F_o}=\left(\frac{x+a}{R_o}\right)^2\frac{(\rho U^2)}{(\rho U^2)_{mean,o}}\,\frac{(\rho U^2)_{c,x}}{(\rho U^2)_{c,o}}\int_0^1 \eta_v\,\eta_h\,\frac{d(\rho U^2)}{(\rho U^2)_{c,x}}\;\cdots\cdots\text{(A-2)}$$

3. Perimeter-Mean Jet Boundary-Shear Stress

$$\frac{\tau_b}{(\rho U^2)_{c,x}}=\frac{1}{\left(\dfrac{4P}{\pi D_o}\right)}\,\frac{(\rho U^2)_{mean,o}}{(\rho U^2)_{c,o}}\,\frac{(\rho U^2)_{c,o}}{(\rho U^2)_{c,x}}\left(-\frac{d(F/F_o)}{d(x/D_o)}\right)\;\cdots\cdots\text{(A-3)}$$

This derivative was evaluated graphically from Fig. 19.

4. The Radial-Component Mean Velocity

$$\frac{V}{U}=\eta-\frac{1}{\eta\,\dfrac{U}{U_c}}\int_0^\eta\frac{U}{U_c}\,\eta\,d\eta\;\cdots\cdots\text{(A-4)}$$

5. The Shear-Stress Across a Jet Profile

$$\frac{\tau}{(\rho U^2)_{c,x}}=-\frac{1}{\eta}\,\frac{U}{U_{c,x}}\int_0^\eta\frac{U}{U_{c,x}}\,\eta\,d\eta\;\cdots\cdots\text{(A-5)}$$

Equation A-5 assumes incompressible flow.

Nomenclature

a = upstream distance of the apparent point source (Table 1) feet.
D_o = outlet diameter, feet.
F = axial-direction momentum impulse force at distance x, pounds.
F_o = momentum impulse force at the outlet, pounds.
P = jet perimeter, feet.
R_o = outlet radius, feet.
U = axial-component mean velocity, feet per minute.
V = radial-component mean velocity, feet per minute.
W = jet flow rate at distance x pounds per minute.
W_o = jet flow rate at outlet, pounds per minute.
ϵ = eddy viscosity, $(\text{feet})^2$ per second or $(\text{feet})^2$ per minute.
ν = kinematic viscosity, $(\text{feet})^2$ per second or $(\text{feet})^2$ per minute.
η_v = abscissa for the vertical velocity profiles, given by Equation 1 with R measured along a vertical line through the jet axis, dimensionless.
η_h = horizontal counterpart of η_v, dimensionless.
ρ = fluid density, (pounds) $(\text{minute})^2$ per $(\text{foot})^4$. This is obtained by dividing the density in pounds per (cubic foot) by (3600 x 32.2) feet per $(\text{minute})^2$.
τ = axial-direction shear stress, pounds per square foot.
τ_b = axial-direction shear stress on the jet boundary, pounds per square foot.
$(\rho U)_{c,o}$ = axial mass velocity at the outlet, (pounds) (minute) per $(\text{foot})^3$.
$(\rho U)_{av,o}$ = average mass velocity over the outlet area, (pounds) (minute) per $(\text{foot})^3$.
$(\rho U)_{c,x}$ = axial mass velocity at distance x from the outlet (pounds) (minute) per $(\text{foot})^3$.
(ρU) = axial-component mass velocity at any position in the jet (pounds) (minute) per $(\text{foot})^3$.
$(\rho U^2)_{mean,o}$ = mean value of (ρU^2) over the outlet area, pounds per square foot.
$(\rho U^2)_{c,x}$ = momentum impluse force per unit area along the jet axis, pounds per square foot.

58th Annual Meeting

January 28-30, 1952

All highways, skyways, and railways will lead to St. Louis this month when ASHVE members set out from virtually every point in the United States for the Society's 58th Annual Meeting, January 28 to 30 in the famed Mound City. Meeting headquarters will be in the beautiful Statler and Jefferson Hotels.

Every indication points to a record attendance of the stellar program prepared by the St. Louis Chapter's Committee on Arrangements, Chairman B. L. Evans disclosed in a statement urging all members to attend.

Technical Program

Presentation of technical papers at four sessions and a symposium on Industrial Atmospheres will keynote the meeting. The first session will be held on Monday, January 28, at 2:30 p.m., and two papers will be presented.

The second technical session is scheduled for Tuesday, January 29, at 9:30 a.m., with four papers scheduled for presentation. The third session, set for Tuesday, January 29, at 2:00 p.m., will be given to the symposium, titled, *Control of Industrial Atmospheres*. W. N. Witheridge will serve as moderator.

The fourth session is to be held on Wednesday, January 30, at 9:30 a.m. and three papers will be given. The fifth and final session, to be devoted to the subject of warm air heating, is scheduled for Wednesday, January 30, at 2:00 p.m.

A Welcome Luncheon scheduled for 12:30 p.m. on Monday in the Hotel Statler will officially get the meeting under way. Guest speaker at this event will be the interesting sports figure, William (Bill) Veeck, president and owner of the St. Louis Browns, and formerly president and owner of the Cleveland Indians, winners of the 1948 American League Pennant and World Series. Mr. Veeck's address will be titled, *Engineering a Pennant*, and should be one of the real high points of the meeting.

While the technical session is being held on Monday afternoon, the ladies will gather in the Hotel Statler for a tea and a highly interesting exhibit of shoes dating from the Revolutionary period to the present. The exhibit is through the courtesy of the International Shoe Company. On Monday evening, all will meet in the Gold Room of the Jefferson Hotel for a *Meet Me in St. Louis* party, featuring dinner and dancing.

While the Tuesday morning technical session is in progress, the ladies will travel to the Park Plaza Hotel for luncheon and a style show, featuring the latest in gowns, coats, and furs. On Tuesday evening, members and their families and friends can have their choice of two events. One is a *Get-Acquainted Party* in the Hotel Statler, featuring two excellent films, *Prairie Wings* and *Sunrise Serenade*, and the other, an inspection tour of the famous Anheuser-Busch Brewery.

On Wednesday morning, while the technical session is being held, the ladies will set out again, this time for a Bus Tour of St. Louis. Among the highlights of this trip will be visits to the St. Louis Botanical Gardens, where the ladies will hear an address on flowers by G. H. Pring, superintendent of the Gardens, and to the City's Art Museum, where they will have lunch. In the evening, the meeting will reach its climax in the Gold Room of the Jefferson Hotel when all join for the traditional banquet. Guest speaker will be Ralph Carney, Wichita, Kan., and his address is titled, *New Strength for America*.

As the JOURNAL went to press, the St. Louis Chapter joined to extend a final invitation to members to *come to the City Surrounded by the United States for the 58th Annual Meeting*. In all respects, they promise, it will be an event that the member will cherish among his fondest memories.

Meet you in St. Louis!

Method of Choosing Location of, Financing and Conducting Meetings of the Society

Resolved: That inasmuch as the Annual and Semi-Annual Meetings of the Society come under the jurisdiction of the Council, the following rules governing the handling of such meetings be adopted by the Council and published in the JOURNAL of the Society at least twice during every year, preferably just prior to each meeting.

1—The Council will select the city in which the Annual or Semi-Annual Meeting is to be held, giving due consideration to the invitations received from Chapters or members as well as to the advisability of so distributing those meetings as to make them of the greatest advantage to the general membership, and to reduce as far as possible the expense of members attending.

2—That an appropriation be made to cover the entertainment or local expenses, incurred in connection with the meeting, and the regular meeting expenses to be taken care of by the General Fund of the Society in the regular way.

3—That no registration fee or compulsory obligations of any nature be imposed on members or guests.

4—That the purchase of tickets for banquets or for any other form of entertainment that may be provided be entirely voluntary.

5—That the grouping of features and the sale of tickets for group features be discouraged.

6—That the raising of funds from manufacturers of heating apparatus be discouraged.

7—That the display of samples, or of literature, advertising the product of any manufacturer in any way, shape or form, be not permitted at the booths, registration desk, or in or about the meetings.

8—That the distribution of trade papers be entirely at the discretion of the committee in charge.

9—That the local Chapter or local members be empowered to form a General Committee with such sub-committees as may be required to handle the details of transportation, hotel accommodations, entertainment, finance, etc., and that this General Committee be requested to confer frequently with the Council, through the Executive Secretary of the Society, and to make frequent reports on progress in connection with the various matters being handled by them.

10—That the arrangements of elaborate and costly entertainment features be discouraged.

Adopted at Council Meeting, January 29, 1926.

PROGRAM ASHVE ANNUAL MEETING — ST. LOUIS

Sunday—January 27

10:00 a.m. Council Meeting (Hotel Statler)

10:00 a.m. Committee on Research (1951)

1:30 p.m. REGISTRATION (Hotel Statler)

2:00 p.m. Motor Tour (scenic spots in St. Louis)

2:00 p.m. Welcome Tea for Members and Ladies (Hotel Statler)

Monday—January 28

8:30 a.m. REGISTRATION (Hotel Statler)

9:30 a.m. TAC on Air Distribution, G. B. Priester, *Chairman*

9:30 a.m. TAC on Combustion, T. H. Smoot, *Chairman*

9:30 a.m. TAC on Heat Flow Through Glass, R. A. Miller, *Chairman* (Hotel Statler)

9:30 a.m. TAC on Panel Heating and Cooling, *Group B*, J. M. Van Nieukerken, *Chairman* (Hotel Statler)

10:00 a.m. Chapters Conference Committee, J. R. Vernon, *Chairman*

12:30 p.m. WELCOME LUNCHEON (Hotel Statler—*Ballroom*)
Speaker: William (Bill) Veeck, President, St. Louis Browns *Subject*: Engineering a Pennant

2:30 p.m. FIRST TECHNICAL SESSION (Hotel Statler)
Pres. Lauren E. Seeley presiding
Greetings, L. L. Hamig, President, St. Louis Chapter
Response by President Seeley
Reports of Officers
Amendments to By-Laws, H. E. Sproull, *Chairman*, Charter and By-Laws Committee
Venting Hot Water Heating Systems, by F. E. Giesecke
Self-Charging Electrostatic Filters, by W. T. Van Orman and H. A. Endres

2:30 p.m. Ladies' Tea (Hotel Statler)
Shoe styles from 17th Century to date from Shoe Museum of International Shoe Company

3:30 p.m. Special group called together to discuss problems of instantaneous heat gain and cooling load

4:00 p.m. TAC on Panel Heating and Cooling, *Group A*, A. B. Algren, *Chairman*

7:00 p.m. "Meet Me in St. Louis" Party — Dinner and dancing (Jefferson Hotel — *Gold Room*)
The "ASHeVErs Review of 1952"

Tuesday—January 29

9:00 a.m. REGISTRATION — (Hotel Statler)

9:30 a.m. SECOND TECHNICAL SESSION (Hotel Statler)
First Vice Pres. Ernest Szekely presiding
Report of Committee on Research, I. W. Cotton, *Chairman*
A V-Wire Direction Probe, by H. B. Nottage, J. G. Slaby, and W. P. Gojsza
Radiant Energy Emission of Atmosphere and Ground: A Design Factor in Heat Gain and Heat Loss, by G. V. Parmelee and W. W. Aubele
Isothermal Ventilation-Jet Fundamentals, by H. B. Nottage, J. G. Slaby, and W. P. Gojsza
The ASHVE Environment Laboratory, by Cyril Tasker, C. M. Humphreys, G. V. Parmelee, and L. F. Schutrum (To be presented by title.)

11:30 a.m. Buses Leave for Ladies Luncheon and Style Show (Park Plaza Hotel — *Tiara Room* — Luncheon at 12:30 p.m.) Style Show featuring furs

12:00 noon Luncheon Meetings:
TAC on Hot Water and Steam Heating, J. W. James, *Chairman*
TAC on Sorbents, G. L. Simpson, *Chairman*
TAC on the Heat Pump, R. C. Jordan, *Chairman*

2:00 p.m. THIRD TECHNICAL SESSION (Hotel Statler)
Pres. Lauren E. Seeley presiding
Symposium — The Industrial Atmosphere
Moderator: W. N. Witheridge, Chairman, TAC on Industrial Ventilation, Detroit, Mich.

1. Integration of Process and Human Requirements, by H. A. Mosher, Rochester, N. Y.
2. Effect of Atmospheric Requirements on Industrial Architecture and Plant Layout, by A. T. Waideloch and W. Hunting, Cleveland, Ohio
3. Equipment for Industrial Ventilation and Air Pollution Control, by R. P. Warren, Buffalo
4. Effects of Industrial Environmental Factors on Workers and on the Community (Occupational Health and Air Pollution) by R. A. Kehoe, M.D., Cincinnati, Ohio

Motion picture on Principles of Exhaust Ventilation — presented by K. E. Robinson, Lansing, Mich. (University of Michigan), Arnet B. Epple, University of Michigan, and J. M. Kane

4:30 p.m. Chapters Conference Committee, J. R. Vernon, *Chairman*

6:30 p.m. Past Presidents' Dinner

6:30 p.m. Nominating Committee Dinner Meeting

7:00 p.m. TAC on Cooling Load, W. E. Zieber, *Chairman*

7:00 p.m. TAC on Heating Load, W. S. Harris, *Chairman*

7:00 p.m. TAC on Weather Design Conditions, W. M. Wallace, II, *Chairman*

8:00 p.m. Get Acquainted Night — Featuring Edgar M. Queeney movies "Prairie Wings" and "Sunrise Serenade" (Hotel Statler — *Missouri Room*)

8:00 p.m. Inspection trip through Anheuser-Busch Brewery

Wednesday—January 30

9:00 a.m. REGISTRATION (Hotel Statler)

9:30 a.m. FOURTH TECHNICAL SESSION (Hotel Statler)
Second Vice Pres. Reg F. Taylor presiding
Gas is an Important Factor in Thermal Conductivity of Most Insulating Materials, by F. B. Rowley, R. C. Jordan, C. E. Lund, and R. M. Lander
Thermal Performance of Frame Walls, by G. O. Handegord and N. B. Hutcheon
Physiological Adjustments of Clothed Human Beings to Sudden Changes in Environment: First Hot Moist and Later Comfortable Conditions, by F. K. Hick, M.D., Tohru Inouye, R. W. Keeton, M.D., Nathaniel Glickman, and M. K. Fahnestock

10:30 a.m. Ladies Bus Tour — Points of interest in St. Louis, featuring the world-famous Missouri Botanical Gardens, with a talk on flowers by G. H. Pring, Superintendent. Luncheon at the St. Louis Art Museum "Building World's Fair 1904"
Return to Jefferson and Statler Hotels at 2:30 p.m.

12:00 noon Luncheon meeting TAC on Panel Heating and Cooling, P. B. Gordon, *Chairman*

2:00 p.m. FIFTH TECHNICAL SESSION (Hotel Statler)
Pres. Lauren E. Seeley presiding
Warm-Air Perimeter Heating, Part II — Temperature Drop in Ducts Embedded in Concrete Floors, by J. R. Jamieson, R. W. Roose, S. Konzo, and H. T. Gilkey
Warm-Air Perimeter Heating, Part III — Heat Losses from Floor Slab, by J. R. Jamieson, R. W. Roose, and S. Konzo
Performance of a Warm-Air Radial-Feeder Perimeter Loop System in a Residence, by M. E. Childs, R. W. Roose, and S. Konzo
Installation of Officers
Adjournment

4:30 p.m. Organization Meeting of 1952 Committee on Research

7:00 p.m. ANNUAL BANQUET (Jefferson Hotel — *Gold Room*)
Speaker: Ralph Carney, Wichita, Kan.
Subject: New Strength for America
Presentation of Past President's Emblem to Dean Lauren E. Seeley
Presentation of F. Paul Anderson Medal

Thursday—January 31

9:30 a.m. Council Meeting (Hotel Statler)

Homer Addams to Receive F. Paul Anderson Medal

HOMER ADDAMS, now the only living Charter Member of the Society and a past president of ASHVE, will receive the F. Paul Anderson Medal for 1951. Presentation of the medal will be made at the Society's 58th Annual Meeting in St. Louis, January 30, 1952, by Pres. Lauren E. Seeley.

The F. Paul Anderson Medal was established in 1930 by the late Thornton Lewis of Philadelphia, president of the Society in 1929, and is awarded to ASHVE members *in recognition of outstanding work in the field of heating, ventilating, and air conditioning.* Recipients of the award are selected by the Council.

Mr. Addams is the tenth member to be thus honored since the award was established. Others to achieve the honor were: the late Dr. Willis H. Carrier, Dr. A. C. Willard, Prof. Frank B. Rowley, Dr. F. E. Giesecke, the late Dr. Ferry C. Houghten, Capt. Alfred E. Stacey, Jr., the late J. Herbert Walker, Dr. C.-E. A. Winslow, and Samuel R. Lewis.

Mr. Addams' career, paralleling that of the ASHVE, has been closely identified with the advancement of engineering practice, research, and development techniques in the field of heating and air conditioning. His nomination for the F. Paul Anderson Medal was in recognition of his notable contributions to the advancement of the art in the fields of boiler design and performance.

The son of Anna and Jacob Addams, Homer Addams was born on June 22, 1873, in Addamstown, Pa., a town established by his ancestors in the early 1700's.

He began his business career at the age of 15 after completion of preliminary education in public schools in the Addamstown area and in the Schuylkill Seminary. His early entrance into the business world was necessitated by the fact that his father, a minister in the Evangelical Church for 35 years, had died when Homer was 8 years old, and the meagre wages of a man of the clergy meant that family savings were insufficient to sustain the Addams' household for very long. The desire for education was strong in young Addams, however, and, even though he was working, he managed to combine business with study, taking whatever business and engineering courses he could in his off-hours.

His first job was as a helper, installing heating plants in Eastern Pennsylvania. In 1895, after completing his education and acquiring his basic experience, he became connected with Barber and Ross, a heating contracting firm of Washington, D.C., as an estimator and engineer in charge of construction.

Mr. Addams remained with that firm until 1896, when he joined a group of cast-iron boiler manufacturers in Philadelphia to handle development, engineering, and research of their products. During that same year, he was among that immortal group of 75 engineers who met in New York City to form THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS and thus write the first chapter in a new concept of comfort, health, and well-being for people everywhere.

In 1903, Mr. Addams became connected with the Kewanee Boiler Company of Illinois and was sent to Washington as a special representative to contact Government agencies and to act as a consultant on various heating projects. He served in this position for about three years and then resigned to go with the Model Heating Co., Philadelphia, as assistant secretary. The following year he became associated with the Fowler and Wolfe Manufacturing Co., also of Philadelphia, as secretary.

In 1911, Mr. Addams rejoined the Kewanee Co. to set up a New York branch and also to serve as sales manager of the operation. From 1911 through 1918, he spent considerable time in Washington as a liaison representative between the company and the Government on the design and development of boilers and hot water heaters.

Foreseeing the extended growth of construction along the eastern seaboard and the prospect of sizable business volumes, Mr. Addams joined with the Kewanee Boiler Company of Illinois in 1920 to form a subsidiary company known as the Kewanee Boiler Company of New York. His initial position with the new firm was vice president, but in 1921 he became president.

The same year he acquired the Fitzgibbons Boiler Co., of Oswego, N.Y., and also became its president. A growing concern, this organization with its existing shop provided a supplemental source of products and eastern warehousing facilities for the rapidly expanding construction markets in the territory.

Until recent years, Mr. Addams was active head of both companies, vigorously directing the development of the units from small, local entities, to great organizations with branches in virtually every part of the United States and in many foreign countries.

He resigned as president of the Fitzgibbons Boiler Company in 1947 and was succeeded by his son, Paul. Concurrently, he became chairman of the Board of Directors of the firm. Still in excellent health at 78, he pursues his new responsibilities with the same fervor that marked his long and outstanding career as president.

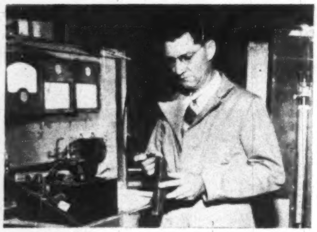
Mr. Addams has been extremely active in the affairs of the Society. He served as president in 1924; first vice president, 1923; treasurer, 1915-22; and on the Council, 1915-22. In addition, he was active in the founding of the Society's Research Laboratory at the United States Bureau of Mines in 1919, and was a member of the first Guide Committee in 1922.

Among countless other Society positions in which he has served are: chairman of the finance and membership committees, and the Advisory Board; chairman of the Code Committee for Testing Low Pressure Boilers; and member of the Committee to Confer with *ASME* Boiler Code Committee on Heating Boilers. Furthermore, he was a frequent participant in seminar round table discussions on scientific matters pertaining to the heating and ventilating of all types of buildings. In addition to being the only living Charter Member of the Society, he is also a charter member of the Philadelphia Chapter. He was elected to Life Membership in the Society in 1932.

Mr. Addams also holds memberships in the *American Society of Mechanical Engineers*, the *American Uniform Boiler Society*, the *Steel Boiler Institute, Inc.*, the Engineers Club of New York, and the Engineers Club of Philadelphia. He is a member of Greenleaf Lodge, F. & A. M., Allentown, Pa., and several years ago celebrated his fiftieth year in this organization.

ARTHUR THEOBALD IN SEQUOIA POST

Arthur Theobald, widely known in the heating industry and a member of the Society, has been appointed chief engineer for Sequoia Manufacturing Co. of San Carlos, Calif., it was disclosed recently by the firm's president, Robert Kramer. Mr. Theobald, associated with the Payne Furnace Co. for 26 years, already has taken over his new duties at Sequoia.


Art Theobald, new chief engineer of Sequoia Mfg. Co.

Sequoia's new chief engineer is a native of Utah and an alumnus of Brigham Young University. He was connected with Payne from 1922 to 1948, much of that time serving as the firm's chief research engineer. For the past few years he was manager of an air conditioning business in El Paso, Tex.

Mr. Theobald is credited with the original development of the first direct-fired overhead unit heaters and also the closet-type furnace. A frequent contributor of papers to societies and publications, he also was a member of several P.C.G.A. committees, including the committee for the improvement of gas utilization equipment which received the *honor award* in 1944, and gas heating division manufacturers section and committee on codes and regulations which received the same award in 1948. It was the latter committee which figured importantly in the standardization of *LPG* requirements for the southwest states in 1947. He served as president of the Society's Southern California Chapter in 1947.

ILLINOIS CHAPTER'S PAST PRESIDENTS FORM GROUP

The past presidents of the Illinois Chapter met November 19 for dinner at the Merchants & Manufacturers Club, Chicago, and formed a *Past Presidents' Club*. S. R. Lewis was named *president of the past presidents* and P. J. Marschall was elected vice president of the group.

Prime purpose of the new group is social, with two or three dinner meetings planned during the year. However, the past presidents will be available to the chapter officers, should their advice or other services be requested.

G. W. Bornquist, current president of the Illinois Chapter, attended the dinner and meeting by special invitation.

The others who attended — all past presidents of the Illinois Chapter, which was organized in 1906 and is the oldest of the Society's local chapters — were, O. J. Prentice, A. O. May, S. I. Rottmayer, C. W. DeLand, J. H. Milliken, E. P. Heckel, Sr., W. A. Kuechenberg, C. E. Price and C. M. Burnam, Jr.

Mr. Kuechenberg read a letter sent him in 1948 by the late John Howatt, a past president of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS and a past president of the Illinois Chapter, congratulating the chapter on its first annual *past presidents' night* and suggesting the formation of a group composed of the chapter past presidents.

Mr. Marschall read messages of congratulation from a number of chapter past presidents who could not attend the meeting but looked forward to being on hand for future such gatherings. Messages from out of town included greetings from L. S. Ries, J. S. Locke, E. M. Mittendorff, J. R. Vernon, J. A. Cutler, and J. C. Hornung. Mr. Prentice paid tribute to the friendships formed in the ASHVE and the chapters, and expressed his pleasure in the formation of the new past presidents' group.

JENNINGS EDITS *ASRE* DATA VOLUME

Prof. B. H. Jennings, chairman of the Department of Mechanical Engineering at the Technological Institute of Northwestern University, Evanston, Ill., and a member of ASHVE, is the editor-in-chief of the seventh edition of the *Refrigeration Fundamentals* volume of the *ASRE* Data Book. The handbook of refrigerating data includes the work of 53 authors under Professor Jennings' direction, and is a well known basic reference book for the refrigeration industry. Professor Jennings is a past president of *ASRE*.

He is extremely active in ASHVE work, serving on the Guide Publication Committee, 1947-48 and 1950-51; TAC on Air Sterlization and Odor Control, 1945-46; and TAC on Air Sterilization, 1947-49. He is currently a nominee for a three-year term on the Society's Committee on Research.

Residence Heating Debated Before Illinois Chapter

J. W. Norris
Marshalltown, Ia.

Members of the Illinois Chapter heard John W. Norris, president of Lennox Furnace Co., Marshalltown, Ia., and Martin Weil, president of Weil McLain Co., Chicago, Ill., discuss the proper way to heat a residence, at the November 12 meeting of the Chapter.

Admitting that forced warm air heating has suffered from growing pains far more than hot water heating and that many poorly designed and installed FWA systems have been sold, Mr. Norris stated that this method has now come of age. Advantages which he stressed include the ability to provide ventilation, air motion and the filtering of air, together with adaptability to year around air conditioning. In his opinion, continuous air circulation is of basic importance and this, combined with the use of sensitive thermostats and the thermal storage capacity of the heating system, tends to produce a modulating effect so that room temperature variations are less than 0.5 F.

Today's modern basementless homes which have concrete slab floors are best heated by the forced warm air system of perimeter heating, says Mr. Norris. Heating problems caused by large picture windows are readily handled by the use of slot type diffusers located so as to cause a blanket of warm air to be discharged upward across the windows and out of the way of the occupants. According to Mr. Norris, both the perimeter system and the use of high wall supply registers lend themselves to summer air conditioning.

Martin Weil
Chicago, Ill.

In describing the advantages of wet heating systems, Mr. Weil asked the audience to think in terms of heat distribution within a room and comfort rather than the total amount of heat supplied to a room. He emphasized the importance of controlling the amount of heat which is lost by radiation from the human body and described the advantages to be gained by placing radiators and convectors near cold walls and under windows. He also described the advantages of radiant panel heating systems and baseboard heating units and mentioned that wet type heating systems are not dependent upon fans which may cause noise, drafts, and unwanted cross ventilation between various rooms.

SOUTHWEST TEXAS CHAPTER HOLDS ALL-DAY CONFERENCE

An all-day conference open to all persons interested in air conditioning for either industrial or human comfort purposes was conducted by the Southwest Texas Chapter on October 26 in the St. Anthony Hotel, San Antonio, Tex.

The purpose of the conference was to bring men of the industry together to (1) study and discuss problems, new developments, and new ideas in the fields of heating, ventilating, and air conditioning; (2) to foster a closer relationship and a better understanding between the several trades and the professions; and (3) to assist in building and maintaining a sound engineering foundation for the industry.

Six addresses and a luncheon talk keynoted the conference, with three presentations each being delivered at the morning and afternoon sessions. Speakers and their subjects were: Robert Brindle, the Crane Co. — *Application of Valves;* James Powell, Egglhoff Engineers, San Antonio — *Steam Boiler Feed Water and Return Piping;* Arthur Cox, Pure Air Division, American Solvent Recovery Corp., Columbus, Ohio — *Purification of Air by Activated Carbon;* Roy Hinman, Carrier Corp., Dallas, Tex. — *Servicing Automatic Controls;* and Chet Blome, manager, Midwest Division, Williams-Wallace Co., Dallas, Tex. — *Venting Gas-fired Equipment.* The luncheon speaker was B. P. Fisher, Southern Furnace and Supply Corp., Houston, Tex., who delivered an address titled, *The Future of Air Conditioning.* Prof. Wayne E. Long, Chapter vice president, presided at the morning session, and secretary-treasurer D. E. Locher took charge of afternoon activities. Assisting in arrangements for the program, which was considered to be an outstanding success, according to reports, were F. C. Benham, J. G. Hopping, Jr., and L. H. Hornor, Jr. Pres. I. W. Wilke presided over a short business meeting conducted prior to the opening of the conference.

JOURNAL SECTION

*Summary of Chapter Meetings**

• *ATLANTA*—November 12, 1951. A social hour and dinner preceded the business meeting, which was called to order by Pres. E. K. Jamison. The minutes of the last meeting were read and approved and the treasurer's report was presented. The nominating committee, consisting of W. M. Garrard, chairman, Leo Sudderth, Jr., and L. L. Barnes, submitted their nominations for officers for 1952. The nominees are: *president*—F. A. Player; *vice president*—J. G. Croley; *secretary*—J. M. Lazenby; *treasurer*—T. A. Barrow, Jr.; and *board of governors*—E. K. Jamison and W. M. Garrard.

Mr. Crawford of the Fiberglas Corp. introduced the guest speakers of the evening, S. J. Stach and G. D. Hartzell, both of whom are also from Fiberglas Corp. Mr. Stach spoke on *Vapor Barriers in Insulation*, while Mr. Hartzell's topic was *Thermal and Acoustic Insulation Material*. Both speakers presented some very valuable information regarding the application of insulation and illustrated their talks with samples of the various types of insulation and vapor barriers available. Attendance 66.

• *ATLANTA*—October 8, 1951. Members and guests met for a social hour and dinner held at Harris Tea Room. In the absence of Pres. E. K. Jamison, G. D. Guler called the meeting to order and the minutes of the preceding meeting were read and approved. H. King McCain, chairman of the special code committee to study the letter issued by the City of Atlanta Heating and Ventilating Code Committee, submitted the committee's recommendations with regard to the questionnaire. The membership indicated approval and unanimously voted that the recommendations be sent to the City Code Committee.

W. M. Garrard introduced the speaker of the evening, Lewis Smith of C. A. Dunham Co., New York, N.Y., who presented a very interesting, illustrated talk on the special features of the heating system used in the Parkchester apartment project in New York City. Attendance 41.

• *BALTIMORE*—November 21, 1951. The meeting was called to order by Pres. W. P. Flanigan in the Engineers Club of Baltimore, and the reading and approval of the minutes followed.

President Flanigan then read a letter from Society Pres. Lauren E. Seeley in which he commended the Chapter for its aggressive spirit and predicted that it would be among the most active ASHVE groups.

The speaker of the evening was Lewis Smith, eastern representative of the C. A. Dunham Co., who gave an interesting address on the special piping system which he had designed. The address was accompanied by slides showing the system in service in such housing projects as Fresh Meadows, Parkchester, Stuyvesant Town, and Peter Cooper Village in New York City. Attendance 46. Attendance ratio 0.42.

• *CENTRAL NEW YORK*—October 24, 1951. The meeting was called to order by Pres. J. H. Carpenter at 8:00 p.m. in the University Club, Syracuse, N.Y., and reports by the secretary and treasurer were read and approved. As an added meeting feature, prior to dinner, members travelled to the newly constructed Onondaga County War Memorial auditorium to inspect the ventilation, piping, and air conditioning system there. Following dinner, C. F. Woese, Robson & Woese, Inc., consulting engineering firm, provided some interesting information on the design of the ventilating and skating rink refrigeration systems at the auditorium.

The speaker of the evening was Lauren E. Seeley, dean, College of Technology, University of New Hampshire, Durham, N.H., and president of the Society, who presented his interesting address, *Engineering with a Human Touch*. Attendance 69. Attendance ratio 0.40.

• *CENTRAL OHIO*—November 5, 1951. The meeting was called to order by Pres. R. S. Curl at 8:00 p.m. at the Grandview Inn. The minutes of the previous meeting were read and approved, and the treasurer reported that the membership cards were being reprinted and would be mailed as soon as they were ready. It was announced that the Chapter would participate in the Columbus Technical Council Program to be televised on January 20.

The guest speaker of the evening was Lauren E. Seeley, president of the Society, and dean, College of Technology, University of New Hampshire, Durham, N.H. Dean Seeley spoke on *Engineering with a Human Touch*, and according to the secretary's report the talk was very interesting and enjoyed by all. Attendance 41.

• *CENTRAL OHIO*—October 11, 1951. Pres. R. S. Curl called the

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Note: The attendance ratios shown represent the membership attendance divided by the chapter membership. These ratios will be useful as a partial indication of interest shown by local chapter members in various types of subjects programmed by the various chapters and may be useful in deciding on subjects for chapter meetings.

meeting to order at 9:00 p.m. in the Grandview Inn. Since the meeting was late in getting underway, the reading of the minutes was dispensed with and no other Chapter business was conducted.

The speaker of the evening was Harry Danz of the American Blower Co., Detroit, Mich., who is in charge of the Industrial Dust Collectors Department. Mr. Danz gave a very interesting talk on *Dust Collecting and Testing*. Attendance 12.

• *CONNECTICUT*—November 15, 1951. Vice Pres. T. L. Arnold, presiding in the absence of Pres. A. J. Lawless, who was unable to attend because of illness, called the meeting to order at the Three Cups Inn, Meriden, Conn.

In a short business session which preceded the feature address, the following members were elected to serve on the nominating committee for 1952-53: Peter Fleury, *chairman;* C. J. Wahnquist, Jr., R. B. Sweet, J. J. Hull, and J. M. Atherton.

The speaker of the evening was R. E. Ferry, general manager, *Institute of Boiler and Radiator Manufacturers*, who spoke on the aims and responsibilities of that organization. A lively question and answer period followed Mr. Ferry's presentation. Attendance 50.

• *CONNECTICUT*—October 16, 1951. Pres. A. J. Lawless called the meeting to order in the Three Cups Inn, Meriden, Conn. The treasurer's report and the minutes of the last meeting were read and approved. The members unanimously approved a motion that the balance of the meetings for the year 1951-52 be held at Three Cups Inn. D. M. Hummel, the Chapter Delegate, reported briefly on the Semi-Annual Meeting held at Portland, Ore., in July.

President Lawless introduced P. B. Gordon, vice president, Wolff & Munier, New York, N.Y., who was the speaker of the evening. Mr. Gordon delivered an excellent address on *Radiant Panel Heating*, which he illustrated with slides. In addition, he described some of the research which will be conducted, as well as some of the new equipment installed at the Society's new Environment Laboratory. Attendance 65.

• *CINCINNATI*—November 6, 1951. Dean L. E. Seeley, College of Technology, University of New Hampshire, Durham, N.H., and president of the Society, was the guest of honor, and was introduced by H. E. Sproull, treasurer of the Society. Dean Seeley gave a coffee talk on the subject, *Engineering with a Human Touch*.

The business meeting was called to order by Pres. J. J. Bechtol, and R. G. Anderson, program chairman, announced that Dr. Ludeke, University of Cincinnati, would address the Chapter at the December meeting. After a few reports were presented, President Bechtol spoke briefly on the forthcoming Annual Meeting to be held in St. Louis.

The feature address of the evening, on the subject, *Hot Water Heating Systems*, then followed. The speaker was J. W. James, vice president in charge of research, McDonnell & Miller Inc., Chicago, Ill. Attendance 70. Attendance ratio 0.49.

• *EMPIRE STATE CAPITAL*—October 23, 1951. An informal dinner was held, prior to the business meeting, at Bleeker's Restaurant, Albany, N. Y., at 7:00 p.m. This meeting had been advanced from the scheduled date of November 13, in order to coincide with the visit of Dean L. E. Seeley, College of Technology, University of New Hampshire, Durham, N. H., and president of the Society.

The feature of the evening was Dean Seeley's address, *Engineering with a Human Touch*, in which he described his own research work regarding the conditioning of the air which we breathe in the nasal passage. Dean Seeley displayed some of the equipment which he used in his experiments and explained the use of each. The talk was very interesting and informative and a rising vote of thanks was extended to Dean Seeley at the conclusion of the question and answer period. Attendance 33. Attendance ratio 1.00.

• *INDIANA*—September 28, 1951. Pres. F. C. Barton called the meeting to order at 8:00 p.m. in Turners Athenaeum, Indianapolis. Among business handled during a short session was the appointment of a committee to determine a permanent meeting place, since the Construction League, former site of Chapter gatherings, had made arrangements with another organization for Friday nights.

Prior to introducing the guest speaker of the evening, I. W. Cotton, chairman of the ASHVE Committee on Research, discussed the many benefits being derived from Society research and provided members with some idea of what they could expect to see if they attended the inauguration of the Environment Laboratory on November 1 and 2 in Cleveland.

The speaker of the evening was L. L. Holmes, consultant, personnel and management; founder, and executive director of the Management Research Associates of Indianapolis. Mr. Holmes delivered an interesting address on the subject, *How's Your GP*, or, namely, *potential growth*. Attendance 87.

• *IOWA*—November 12, 1951. Following a social hour and dinner, Pres. C. H. McGuiness called the meeting to order in the Standard Club. The minutes of the October meeting were read and approved, and as is customary, the president and vice president were appointed member and alternate member, respectively, on the Chapters Conference Committee. President McGuiness announced that the Chapter was holding joint meeting with *ASME* on December 5, and that Dean L. E. Seeley would be the speaker.

T. H. Smoot, director of research, The Lennox Furnace Co., Marshalltown, Ia., was introduced by President McGuiness as a new member of the Iowa Chapter. Mr. Smoot, who is a member of the Society's Committee on Research and chairman of the TAC on Combustion, gave a brief and interesting account of the Society's procedure for introducing and inaugurating new research projects. He also discussed a possible new research project concerning problems in flame pulsation in oil burners and resonance in gas fired equipment.

Bowen Campbell introduced the speaker of the evening, William Nanes, who spoke on the subject, *Warm Air Heating*. Mr. Nanes gave an interesting talk on the heating and air conditioning system, which he himself had designed, that was installed in the new building of the Iowa Power and Light Co., Des Moines. He explained that the job was unique in that four completely different types of heating systems were designed and layed out for purposes of comparison and economic analysis, and two of these systems were finally installed, each capable of heating the building independent of the other.

The four systems considered were as follows: (1) low pressure warm-air duct system with ceiling distribution, (2) window-unit system using hot and cold water for year around service, (3) high-pressure duct system with air introduced under each window, and (4) special summer-winter air conditioning system.

A study of these systems revealed that the high pressure under the window system could be installed at lowest cost. The Iowa Power and Light Co. decided to install both the hot water and warm air under window system, although subsequent tests have shown that the warm-air system alone can produce the more comfortable conditions. Mr. Nanes stated that as a result, the company will use warm air exclusively when they build the other half of the office building with an anticipated saving of about $60,000. Attendance 46.

• *KANSAS*—November 7, 1951. Due to the absence of Pres. R. F. Bauer, Vice Pres. O. P. Bullock presided and called the meeting to order at 8:15 p.m. in the Colony Restaurant. Immediately following roll call and the reading and approval of minutes, the meeting was turned over to the guest speaker of the evening, Alden Truvillo, industrial manager, Chamber of Commerce, City of Wichita, who conducted an interesting round-table discussion on the subject, *Wichita Today and Tomorrow*. The discussion, in which many of the members participated, dealt with the needs of Wichita as a growing city. Attendance 16. Attendance ratio 0.23.

• *KANSAS CITY*—November 5, 1951. The meeting was held at the Wishbone Restaurant, Kansas City, Mo., and was called to order by Pres. C. W. Schumacher. Members and guests gave their names and company affiliations, and the minutes of the October meeting were read and approved. W. A. Reichow announced that the December meeting would feature a demonstration by a representative of the Owens Corning Fiberglas Corp., on the thermal, filtering and acoustical properties of fiberglas.

The meeting was then turned over to G. F. Hellmer, who acted as moderator for the panel discussion on boilers. The panel consisted of F. F. Dodds, branch manager, American Radiator & Standard Sanitary Corp., Kansas City, Mo., who discussed the rating of cast iron boilers; R. B. Mason, branch manager, Kewanee Boiler Corp., who discussed the rating of steel boilers; and C. L. McMichael, sales engineer, H. H. Wright Co., Kansas City, Mo., who spoke on the rating and selection of steel boilers. A general discussion period followed. Attendance 73. Attendance ratio 0.34.

• *MANITOBA*—November 15, 1951. Pres. J. F. Bertram called the meeting to order in Salon A of the Fort Garry Hotel, and the minutes of the previous meeting were read and approved.

Program chairman C. M. Fleming then reported that no definite arrangements had been made thus far for a Christmas Party. The suggestion was offered, however, that a Smorgasbord-type party be held, and this received the full approval of the membership.

President Bertram then announced that the Society was planning to discontinue the practice of providing speakers for Chapters. The Chapter went on record as being opposed to the cancellation of this service.

The guest speaker of the evening was J. Atwood, Carrier Engineering Corp. of Canada, who gave an interesting address on the subject of his firm's conduit system. Attendance 19.

• *MANITOBA*—October 18, 1951. Pres. J. F. Bertram called the meeting to order in Salon A of the Fort Garry Hotel, and the minutes of the last meeting were read and approved. President Bertram then announced that Vice Pres. W. J. Atkinson and Secretary A. K. Piercy were appointed member and alternate member, respectively, to the Chapters Conference Committee meeting, at the Annual Meeting in St. Louis in January.

The feature of the evening was a talk by Major Dawson of the Metropolitan Civil Defense Board on the organization of our local civil defense. Attendance 21.

• *MASSACHUSETTS*—November 20, 1951. The meeting was called to order, following a social hour and dinner, in the Campus Room of the MIT Graduate House. Pres. John Bonner presided, and in the absence of G. B. Torrens, the program chairman, D. W. Blair introduced the speaker of the evening, W. J. Tallafuss, building service engineer, Stone and Webster Engineering Corp. Mr. Tallafuss presented a very interesting address on the subject, *Heat Pump Theory and Design*. Attendance 48. Attendance ratio 0.24.

• *MEMPHIS*—October 15, 1951. Members and guests met for dinner in the King Cotton Hotel, and after officially opening the business meeting, Pres. R. E. Larkin introduced and welcomed the guests. The minutes of the previous meeting were read and approved, and H. H. Wilson, treasurer, reported a delay in the auditing and that all financial transactions would be resumed shortly. He also reminded the members that 1951-52 dues were now payable. President Larkin announced that the date for the next meeting was rescheduled to November 12, so that a visit from Dean L. E. Seeley could be arranged. A. T. Bevil, Chapter secretary, announced that he had received a letter from J. M. Jalenak, who is now stationed at Fort Jackson, S. C., and who asked to be remembered to the Chapter members.

G. C. Burr, meetings chairman, introduced H. C. Kelly, representative of the Pittsburgh Corning Corp., who presented a very interesting and informative discussion on insulation, accompanied with slides and samples. Attendance 35.

• *MIAMI VALLEY*—October 3, 1951. The meeting was called to order by Pres. C. D. Weaver, and, since this gathering was to be a social function, the reading of the minutes was by-passed.

Included in Chapter business handled during a brief session was the announcement by W. G. Wilkins that the new membership drive was to be in the form of a team competition, with the winning teams to feast on steak and the losing unit on beans. Team captains will be F. J. Kroger and J. H. Pierce.

The speaker of the evening was Mr. Bearer, market research specialist, Armco Steel Corp., who gave an interesting presentation on recent developments in sheet steel production at Armco. Attendance 22.

• *MICHIGAN*—November 12, 1951. Pres. G. W. Akers called the meeting to order and reported that the Chapter is currently sponsoring a cooperative program with the student branch of the University of Detroit, in which the Chapter will make available such services as conducting tours and furnishing speakers, trade bulletins on mechanical equipment and pieces of equipment for testing in the engineering laboratories.

C. A. Strand, vice president and program chairman, introduced the speaker of the evening, L. F. Collins, chemical engineer, The Detroit Edison Co., Detroit, Mich., who presented a talk entitled, *The Ten Commandments of Corrosion Engineering for the Industrial Water Field.* Mr. Collins, who is an outstanding authority on the subject, presented a very well prepared and informative talk on a rather difficult subject. He called specific attention to the responsibility of the designing engineers dealing with heating, ventilating, and air conditioning in making sure that otherwise well designed projects are protected from corrosion problems at their inception on the design boards instead of after the jobs are put into operation. The fact that daily process water in the United States amounts to 10 billion gallons per day and cooling water an additional 60 billion gallons per day with an overall cost due to corrosion of 250 million dollars per year, points out the importance of this subject.

Mr. Collins' ten commandments are essentially as follows: (1) there should be collaboration between the process and corrosion engineer, (2) corrosion is not due to the water, but to the impurities in it and to physical forces applied to it, (3) water analysis alone never supplies the answer to a corrosion problem excepting with supplementary data, (4) use the standard corrosion test element for diagnosis of trouble, (5) agitation and heat are the greatest elements to make water corrosive, (6) do not always blame mechanical failures on corrosion, (7) use the corrosion engineer in the design state to save money, (8) be cautious of chemicals which claim prevention of both scale and corrosion, (9) engineer a system to fit your problem — do not use what was okay for some other project, and (10) ask for advice even though it means swallowing your pride occasionally. Attendance 79.

• *MICHIGAN*—October 15, 1951. Pres. G. W. Akers called the meeting to order at 7:30 p.m. and new officers and committee chairmen were introduced. C. A. Strand, vice president and program chairman, then introduced the speaker of the evening, Dean Lauren E. Seeley, president of the Society, and dean, College of Technology, University of New Hampshire, Durham, N.H. President Seeley's address, *Engineering with a Human Touch,* provided an interesting insight into the mechanics of temperature and humidity control in the human body. He revealed a novel approach to the subject, and it was the consensus that he had shed a great deal of light on a little-known subject. Attendance 72.

• *MINNESOTA*—October 1, 1951. The meeting was called to order by Pres. E. F. Snyder in the Robin Hood Room of the Dyckman Hotel, and the minutes of the May meeting were read and approved.

President Snyder then announced the election of the following committee chairmen: B. F. McLouth—*Minnesota Exchanger;* J. L. Hanson—*entertainment;* J. V. Borry—*membership;* W. F. Legler—*publicity;* and William Sturm—*program.*

Mr. McLouth next announced associate editors of the *Minnesota Exchanger* as follows: V. E. Pearson, J. A. Craig, J. E. Haines, H. E. Gerrish, G. R. Whitnah, J. W. McNamara, H. K. Johnson, and S. L. Furber.

The speaker of the evening was Prof. Millard La Joy, University of Minnesota, who gave an informative talk on the subject, *Fundamentals of Automatic Controls.* Attendance 106. Attendance ratio 0.33.

• *MONTREAL*—November 12, 1951. Pres. J. G. Chenevert called the meeting to order at the Berkeley Hotel and the minutes of the October meeting were read and approved. President Chenevert announced that the annual Christmas Party would be held on December 10.

The speaker of the evening was C. F. Neergaard, Neergaard, Agnew & Craig, New York consulting firm in the field of hospital planning, organization, and management. Mr. Neergaard spoke on *Heating and Air Conditioning the Modern Hospital.* The address was followed by a very lively discussion period, which brought out some very interesting points. Attendance 84.

• *NEBRASKA*—November 13, 1951. The meeting was called to order by Pres. K. E. Martin in the Hotel Castle, Omaha, and members introduced a number of guests who were on hand for the event.

President Martin called attention to the improved lecture desk and pointed out that W. B. Howard was responsible for applying the new ASHVE emblem to it.

Members were then informed of a Stag Party for the January meeting and also that Society Pres. Lauren E. Seeley was scheduled to speak at the December gathering.

One of the two speakers of the evening was H. C. Winters, Office of Price Stabilization, who reviewed the conditions creating the need for price stabilization, and described the role of his organization in effecting compliance with the law. He assured the meeting that no drastic steps would be taken against unintentional violators, but that deliberate infractions would result in prompt and serious action. The second speaker of the evening was Joseph Kulhanek, National Production Authority, who related the need for, and use of, the CMP. Attendance 27.

• *NEW YORK*—November 19, 1951. Members and guests met in the Building Trades Club for a social hour followed by dinner. The business meeting was called to order by Pres. Ernst Graber, and the minutes of the October meeting were read and approved. Two new Chapter members were introduced: K. J. Caplan and P. H. Devlin. W. L. Fleisher, past president of the Society, paid tribute to E. J. Ritchie, Society and New York Chapter member, who died on November 13. Mr. Fleisher spoke of the faithfulness with which Mr. Ritchie always served the Chapter by his constant attendance at meetings, by his service on committees, and as president of the Chapter for the year 1929-30.

Prof. C. F. Kayan introduced the speaker of the evening, Lauren E. Seeley, president of the Society, and dean, College of Technology, University of New Hampshire, Durham, N. H., who spoke on the subject, *Engineering with a Human Touch.* Dean Seeley emphasized the importance of the heating, ventilating and air conditioning engineer in determining the conditions best suited for human comfort and in designing equipment to produce these conditions.

He gave a very interesting description of the origin of his own experiments of the effect of the nasal passages of the human being in conditioning air breathed at various temperatures and humidities. The audience particularly enjoyed his description of the development of the equipment used. He assembled the equipment during the progress of his speech. The meeting was adjourned at 9:30 p.m. with a rising vote of thanks to the speaker. Attendance 60.

• *NORTH CAROLINA*—November 16, 1951. The Chapter held a joint meeting with the Student Branch at North Carolina State College. Following dinner in the State College Dining Hall, the meeting was called to order at 8:15 p.m. in the Engineering Building by Pres. R. O. McGary. The minutes of the October meeting were read and approved.

President Sidney Knarvey of the Student Branch was introduced and welcomed the visiting members. He turned the meeting over to Prof. C. A. McKeeman, who introduced the speaker of the evening, R. S. Dill, chief, Heating and Air Conditioning Section, National Bureau of Standards, and an alumnus of State College.

Mr. Dill explained the research activities of the institutions cooperating with the ASHVE, such as universities and colleges, and told of their contributions to the development of heating, ventilating, and air conditioning in the United States. Attendance 39.

• *NORTH CAROLINA*—October 19, 1951. The members met jointly with the *American Society of Refrigerating Engineers* at the Robert E. Lee Hotel in Winston-Salem. The meeting was called to order by Kirk Cousart, president of the *ASRE*, who welcomed the members of both societies. A letter was then read from A. V. Hutchinson, executive secretary of the ASHVE, acknowledging a check for $200 from the North Carolina Chapter for the Research Laboratory, and also expressing the Society's appreciation for the contribution.

J. W. Barr introduced the speaker of the evening, G. F. Landgraf, vice president in charge of engineering, Trion, Inc., McKeesport, Pa., who delivered an excellent talk on *Electrostatic Precipitation.*

R. O. McGary, president of ASHVE, in closing the meeting, expressed the opinion that joint meetings make for better understanding and fellowship among the members and hoped that more could be scheduled. Attendance 63.

• *NORTH TEXAS*—November 19, 1951. The meeting was called to order by Pres. R. G. Lyford, and members and guests introduced themselves. The minutes of the August, September and October meetings were read and approved. The nominating committee presented the slate of nominees for officers for 1952 as follows: *president*—R. E. Allison; *vice president*—P. N. Vinther; *secretary*—M. W. Brown; *treasurer*—J. A. Ray; and *board of governors*—R. G.

Lyford, W. R. Barbeck, and R. A. Grimmer.

Mr. Barbeck introduced Mr. Vinther, who spoke on the subject, *Panel Cooling*, giving a resume of all the published information he had on hand covering that topic. Attendance 65. Attendance ratio 0.35.

• *NORTH TEXAS*—October 15, 1951. Pres. R. G. Lyford called the meeting to order in the Melrose Hotel at 8:00 p.m., and members and guests introduced themselves. As an added meeting feature, a television set was provided through the courtesy of the Capitol Distributing Co., enabling members to see the film of the Southern Methodist-Notre Dame football game. Included in chapter business handled during a brief session was an announcement regarding the Southwest Texas Chapter's all-day conference on October 26 in the St. Anthony Hotel, San Antonio, and a request by D. C. Pfeiffer that all extra copies of THE GUIDE be sent to him for distribution among Southern Methodist students. The guest speaker of the evening was R. K. Werner, consulting engineer, Fort Worth, and a Society member. Attendance 52. Attendance ratio 0.32.

• *NORTHERN OHIO*—November 12, 1951. The meeting was called to order by Pres. John Richmond, and the minutes of the previous meeting were read and approved.

R. G. Huebscher, secretary, then read a letter from Walter Baggaley, formerly with The Austin Co., Cleveland, who reported that he had accepted the position as professor and head of the mechanical engineering department at the American University in Beirut, Lebanon, Syria.

W. N. Donelson, membership chairman, followed by proposing five new applicants for membership, and it was voted to accept all of the applications.

President Richmond concluded the business session by calling for nominations for Chapter delegate and alternate to the Annual Meeting in St. Louis. R. E. Sherman was elected delegate and J. M. Black was named alternate.

The speaker of the evening was M. I. Levy, president, Viking Air Conditioning Corp., who spoke on the subject, *Perimeter Warm-Air Heating*. Attendance 94. Attendance ratio 0.19.

• *ONTARIO*—November 5, 1951. Pres. William Philip called the meeting to order in the Royal York Hotel, and introduced the new Chapter members. Sixteen members indicated their plans to attend the 58th Annual Meeting in St. Louis in January. As there was no Chapter business to be conducted, the speaker of the evening, T. M. Jacobs, provincial engineer, Ontario Fire Marshals' Office, was introduced.

Mr. Jacobs spoke on *Some Heating and Ventilating Problems due to Atomic Explosion*. The address was accompanied by two films on atomic blasts, namely, *Operations Crossroads* and *The Tale of Two Cities*. Attendance 102. Attendance ratio 0.45.

• *PHILADELPHIA*—November 8, 1951. Pres. E. K. Wagner called the meeting to order at 7:45 p. m. in the Engineers Club, and the minutes of the previous meeting were read and approved. The only business handled in a short session prior to the feature address was the reading and acceptance of the treasurer's report and the submission and approval of the nominating committee roster.

P. B. Gordon, vice president, Wolff & Munier, New York, N. Y., and chairman of the Society's TAC on Panel Heating and Cooling, was the guest speaker of the evening. He gave an extremely interesting address on the subject, *Research on Panel Heating*, and a lively question and answer period followed. Attendance 80.

• *PITTSBURGH*—November 19, 1951. Dinner was served in Webster Hall, and the business meeting was called to order at 8:00 p.m. The minutes of the October meeting were read and approved and there were no other committee reports.

B. B. Reilly, program chairman, introduced the speaker of the evening, T. C. Pratt, an architect with Ingham, Boyd, and Pratt, who spoke on *Heating — As Part of a Building*. He stated that an architect had to be: (1) a planner, (2) an artist, (3) economist, (4) bookkeeper, (5) business man, and (6) a lawyer.

The main thought expressed in the talk was that the heating engineer, the heating contractor, and the manufacturers' salesman should work closer together, and, in general, everyone would be happier. The remainder of his talk was focused on the mutual problems facing the heating and air conditioning engineer in houses and other types of buildings. Attendance 46. Attendence ratio 0.22.

• *ST. LOUIS*—November 13, 1951. Pres. L. L. Hamig called the meeting to order at 7:45 p.m. in Town Hall, and the minutes of the previous meeting were read and approved. J. B. Killebrew reported that many members who had resigned were showing increased interest in the Society and many were being reinstated. B. L. Evans, general chairman of the Committee on Arrangements for the 58th Annual Meeting, reported that plans for the meeting were practically completed and gave a brief description of the events planned. He stated that he was receiving splendid cooperation from the committees. Since the December meeting was scheduled as the Ladies Night meeting, Mr. Evans urged as many members as possible to attend and bring along their wives, in order that the ladies would become bettter acquainted. He stressed the fact that the ladies will play an important part in the success of the Annual Meeting.

C. H. Burnap introduced the speaker of the evening, W. S. Harris, special research associate professor, University of Illinois, Urbana, Ill., who spoke on the subject, *Baseboard Heating*. Before beginning his address, Professor Harris announced that bulletins on various research subjects (including the subject to be discussed) were available at the University of Illinois.

Professor Harris pointed out that the baseboard radiation on which his research was based was of the cast iron type, but that this was now being expanded to cover the nonferrous type as well. There were two types of houses used for conducting the experiments, one was a two-story, well insulated house with basement, the other, a one-story, pre-fabricated house with very little insulation. The floor was concrete slab on the ground. Professor Harris presented test data on three types of systems in the research house, thin tube radiators, radiant baseboard and radiant-convector baseboard. The pre-fabricated house had only radiant-convector baseboard. Professor Harris presented very interesting data on the various types of installations. Attendance 51.

• *SHREVEPORT*—November 15, 1951. The meeting was called to order by Pres. S. W. Beaty in the Colonial Room of the Caddo Hotel. B. E. Segall, chairman of the nominating committee, presented the committee's recommendations for officers for 1952 as follows: *president* — R. M. Hood; *vice president* — W. S. Evans; *secretary* — M. A. Hudson; *treasurer* — R. L. Patton; and *board of governors* — R. S. Segall and J. S. Malahy, Jr. After a brief discussion, it was moved that the nominees be approved as the new officers. In addition to the new officers and the two newly elected members, S. W. Beaty, the past president, will also serve on the board of governors.

A movie, *The Fires Must Not Go Out*, showing the problems and methods of reliable natural gas production and distribution, was then shown. Attendance 26.

• *SOUTH TEXAS*—November 16, 1951. Dinner and a social hour preceded the business meeting which was called to order by Pres. R. J. Salinger. President Salinger introduced G. T. Kerbow, engineer, The Trane Co., Houston, and D. C. McNeil, sales engineer, American Blower Corp., Houston, both of whom provided brief autobiographical sketches. The minutes of the previous meeting and the treasurer's report were read and approved. B. P. Fisher reported that the Student Branch at Texas A & M College had requested the Chapter to provide a speaker for one of their programs, which will be on *Opportunities in the Heating and Air Conditioning Fields*.

Reg F. Taylor, second vice president of the Society, introduced L. E. Seeley, president of the Society, and dean, College of Technology, University of New Hampshire, Durham, N. H. Dean Seeley, who was the Chapter's guest at the April meeting, brought the members up to date on the activities of many of the other Chapters. He spoke briefly about the new Environment Laboratory and the forth-coming Annual Meeting to be held in St. Louis in January.

The meeting was then turned over to a discussion of the new City Code, which was compiled by W. J. Carlon of the City Engineers' office. Mr. Carlon, in speaking on the code, advised how it came into existence, where the various data were accumulated and what he hoped would be accomplished by this code. He extended an invitation to all interested members to inspect the master copies of the code and make suggestions for changes needed in the code. Attendance 57.

• *SOUTHERN CALIFORNIA*—October 2, 1951. Pres. M. C. Greiner called the meeting to order, following dinner at the Carolina Pines Restaurant, Los Angeles. D. C. Evans reported that the membership committee was starting a drive to increase the Chapter membership. Roderick Ross and H. C. Tiller, visiting members from Melbourne, Australia, were introduced. Each had a message from the Australian group of members, which was of interest to all.

The speaker of the evening was A. J. Hess, president, Hess-Greiner & Polland, Los Angeles, Calif., who spoke on *Advances in Heat Pumps*. Mr. Hess discussed recent applications of the heat pump, mentioning that many successful installations were never brought to public attention simply because they were doing what they were designed to do. Mr. Hess stated that the heat pump is of particular interest because of economics and year around load for public utilities. He added that the heat pump works well with radiant panels and in removal of moisture in areas of high humidity, and that it also can be used in reduction of *smog* because of reduction of use of combustible fuels, and can heat water very economically. A question and answer period followed. Attendance 72. Attendance ratio 0.29.

• *SOUTHERN CALIFORNIA*—September 4, 1951. Members and guests met for dinner in the Carolina Pines Restaurant, Los Angeles, and the business meeting was called to order at 8:10 p.m. by Pres. M. C. Greiner. Since there was no Chapter business to be taken care of, the meeting was immediately turned over to V. J. Burke, the program chairman, who introduced the speaker of the evening, A. K. Showalter.

Mr. Showalter, who is chief forecaster for the Weather Bureau in the Arizona and California areas, spoke on *Weather and Air Conditioning*. He explained the innumerable services that were available through the Weather Bureau, and added that the air conditioning industry in these areas could use the information available if someone would correlate this material. He stated that the Air Pollution Board was making use of the services and progress was being made in elimination of excessively *smoggy* days. Mr. Showalter discussed the different temperature conditions one could expect in a 100 mile range from the ocean to the desert and how certain areas, although adjacent to each other, were affected by different climatic conditions. Attendance 63. Attendance ratio 0.26.

• *VIRGINIA*—October 16, 1951. Pres. J. F. Boyenton called the meeting to order at 8:00 p.m. in the auditorium of the R. F. Trant Co. building. The minutes of the previous meeting were read and approved, and President Boyenton reported on the progress to date of the proposed class in heating to be conducted for students under the Chapter's sponsorship.

The program chairman, Laurence Trant, introduced the speaker of the evening, Lauren E. Seeley, president of the Society, and dean, College of Technology, University of New Hampshire, Durham, N. H. Prior to the feature address, Dean Seeley spoke briefly about the Society and its research activities. Dean Seeley's topic was *Engineering with a Human Touch*, and he outlined and commented on the efforts of various engineers, among them such notable Society members as C.-E. A. Winslow, and the late W. H. Carrier and E. V. Hill, to cope with comfort problems. He called attention to the fact that the first edition of THE GUIDE devoted only 8 pages to physiological reactions compared with 150 pages on that subject in THE GUIDE 1950.

Dean Seeley pointed to one significant omission — there has been very little research done on the effects of relative humidity. He described his own independent research on the extent of treatment of air of widely varying temperatures and humidities as it passes through the nasal passages. Dean Seeley's description of the tremendous air conditioning job performed by the human nose was especially interesting, since the instruments involved were described and demonstrated. Attendance 31.

• *VIRGINIA*—September 16, 1951. The meeting was called to order at 8:00 p.m. in the auditorium of the R. F. Trant Co. building. The only business conducted was the reading and approval of the minutes of the June meeting.

The meeting was then turned over to Laurence Trant, program chairman, who presented an industrial movie, *Heat and Its Control*. The movie traced the more familiar types of insulating materials from their raw form through the various manufacturing processes to the finished products, and their application in providing for our industrial needs and domestic comfort. Attendance 20.

• *WESTERN MICHIGAN*—November 12, 1951. Dinner was served to 60 members, ladies, and guests at the American Legion Country Club, Holland, Mich. This being Ladies Night, all Chapter business was dispensed with except for an announcement of the program scheduled for the December meeting.

The speaker of the evening was Dr. Garrett Heyns, warden at Ionia, Michigan Reformatory. Dr. Heyns described the different types of people who are sent to the Reformatory, explained the treatment rendered them, and cited examples of many who returned to civilian life and have made good.

• *WESTERN NEW YORK*—November 13, 1951. First Vice Pres. J. M. Quackenbush, presiding officer, called the meeting to order at 8:00 p.m. in the University Club. The minutes of the October meeting were read and approved; R. Forester outlined the plans for the forthcoming Technical Society Conference at the Hotel Statler in April. It was announced that J. J. Yager and C. H. Love had been informed by A. V. Hutchinson, executive secretary of the Society, that they were voted Life Members in the Society.

Willis Whiting, Minneapolis-Honeywell Regulator Co., spoke on *Domestic and Commercial Gas and Oil Electronic Controls*. Attendance 28.

• *WISCONSIN*—November 19, 1951. Pres. H. F. Brinen called the meeting to order in the Elks Club, Racine, and the reading and approval of the October meeting minutes followed. Among business conducted in an abbreviated session was the announcement that A. X. Smith and A. A. Stutheit had become members of the Chapter, and the disclosure that the December meeting feature was to be a panel on the subject, *Breaking the Second Law of Thermodynamics*. Dr. Jack Wilson, Allen-Bradley Co. and Prof. Edward Fahey, Marquette University, will make up the panel, and member R. S. Hoar will act as moderator.

The guest speaker of the evening was Thomas Danforth, Buffalo Forge Co., Buffalo, N.Y., who provided an interesting presentation on the subject, *General Ventilation*. The address was reinforced with a series of slides showing equipment of present and past designs, including items necessary to meet certain industrial problems. Attendance 79. Attendance ratio 0.30.

STUDENT BRANCH

• *PURDUE UNIVERSITY*—November 14, 1951. Pres. N. J. Kirch called the meeting to order in the Mechanical Engineering Building of the University. Melvin Kalfus reviewed the trip, which Prof. W. T. Miller and several of the students made, to the ASHVE Research Laboratory on November 1 and 2, the dates of the formal opening of the new Environment Laboratory.

President Kirch announced that S. E. Fenstermaker, Jr., of S. E. Fenstermaker & Co., Indianapolis, and Henry Sleik of W. B. Connor Engineering Corp., Danbury, Conn., would be the guest speakers at the November 28 and December 13 meetings, respectively. Mr. Fenstermaker's topic will be *Problems of Engineering*, while Mr. Sleik will speak on *Air Purification*.

A discussion then followed on a project for the Student Branch to undertake for Open House at the University. The following projects were suggested: (a) vapor demonstration, (b) Cleveland trip slides, (c) solar heat, (d) panel heating-radiant heating, (e) panel cooling by radiation, (f) types of wall construction, (g) air circulation and jet air, and (h) condensation on wallpaper. Attendance 10. Attendance ratio 0.67.

STUDENT BRANCH MEMBERS VISIT NEW LABORATORY

Eight members of the ASHVE Student Branch at Purdue University attended the two-day inauguration of the Society's new Environment Laboratory on November 1 and 2 in Cleveland. During their stay, they were luncheon guests of I. W. Cotton, chairman of the Committee on Research, and dinner guests of George Arnold, president of the Dewey-Shepard Boiler Co., Peru, Ind.

Acting as spokesman for the group, N. J. Kirch, Student Branch chairman, said that they were extremely impressed by the Society's newest research facility and by the ASHVE Research Laboratory in general. *We have been hearing a great deal about the ASHVE Research Program and we thought it would be nice to come here and see for ourselves*, he added.

Student Branch members on hand for the event in addition to Mr. Kirch were: R. O. Bement, Rockville Centre, N.Y.; Melvin Kalfus, Forest Hills, N.Y.; F. W. Fults, Indianapolis, Ind.; William Cheek, Jr., West Lafayette, Ind.; P. L. Conway, Warren, Pa.; D. H. May, New York, N.Y.; and Haruo Okinobu, Japan. Prof. W. T. Miller, who directs the heating, ventilating, and air conditioning curriculum at the University, was in charge of the group.

Candidates for Membership

The Society's By-Laws require that all applications for membership or advancement are to be sent to the Executive Secretary and the names of applicants and their references shall be printed in the next issue of the JOURNAL of the Society, or mailed to all members. When the replies are received from references the Candidate's application shall be submitted to and acted upon by the Admission and Advancement Committee as soon as possible.

When the Admission and Advancement Committee has acted favorably upon a Candidate's application and assigned his grade, the Council shall confirm the election of the proposed Candidate for membership. During the past month, there have been 102 applications for membership, including 39 student applications and 1 reinstatement; in addition 4 advancements have been received. The names of these men and their sponsors are published in the following list.

Members are requested to scrutinize the list with care. The Admission and Advancement Committee, and in turn, the Council, urge members to assume their share of responsibility of receiving these candidates into membership by advising the Executive Secretary promptly of any whose eligibility for membership is in any way questioned.

All correspondence in regard to such matters is strictly confidential, and is solely for the good of the Society, which it is the duty of every member to promote.

Unless objection is made by some member by January 31, 1952, these candidates will be voted upon by the Council. Those elected to membership will be notified by the Executive Secretary immediately after election.

BARNARD, W. G., Sales Repr., The Trane Co., Des Moines, Ia. REFERENCES: T. R. Johnson, K. P. Peterson, F. L. Pulley, B. A. Schwirtz.

BEGONIA, J. A., JR., Heating & Sales Engr., Northern Utilities Co., Casper, Wyo. REFERENCES: E. G. Burwell*, Gaylord Chase*, H. G. Connell*, J. M. McIntire*.

BRENNEKE, R. W., Htg. Equip. Mgr., Great Western Fuel Co., Spokane, Wash. REFERENCES: R. H. Angel, H. A. Bickel, L. D. Daniels, R. J. Harris.

BRINKMANN, W. J., Sales Mgr., Air Conditioning Inc., Austin, Tex. REFERENCES: F. B. Frazee, Norman James*, D. E. Locher, G. C. Stoltz*.

BRODIE, A. N., Secretary, J. Brodie & Son, Inc., Detroit, Mich. REFERENCES: A. A. Kernjack, D. J. King, R. H. Oberschulte, K. J. Wagoner.

BROWN, R. K., Sales Engr., Martin-Johnson Engineering Co., Tyler, Tex. REFERENCES: M. A. Hudson, W. S. Keeney, R. L. Patton, J. D. Poythress.

BROWN, T. K., Project Engr., Wright Air Development Center, U.S. Air Force, Dayton, Ohio. REFERENCES: J. R. Carroll, Jr., E. D. Luke*, R. J. Martin*, K. J. Trigger*.

BURWELL, D. L., Mech. Engr., C. L. Toonder & Associates, Detroit, Mich. REFERENCES: D. S. Falk, R. E. Strand, C. L. Toonder, K. J. Wagoner.

CAMPBELL, H. J., JR., Mgr., Air Cond. Div., H. Klein & Sons, Inc. REFERENCES: William Hoops*, Frank Major, Jr.*, A. S. Miller*, J. L. Page.

CARPER, A. B., Mech. Engr., The Austin Co., Cleveland, Ohio. REFERENCES: E. F. Cady, W. N. Donelson, R. L. Geiger, W. W. Greiling.

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Bankston, C. V., Sales Mgr., Industries Sales Corp., New Orleans, La. References: E. A. Burguieres, Jr., L. V. Busenlener, A. J. Pitcher, Jr., E. O. Thoman.

Glanz, E. F., Vice Pres., Glanz & Killian Co., Mechanical Contractors, Detroit, Mich. References: G. W. Akers, L. A. Burch, W. H. Old, E. D. Sheley.

Offner, Theodore, Sr., Mgr., Air Conditioning Division, Gulf Engineering Co., Inc., New Orleans, La. References: J. S. Burke, Walter Cooke, Ralph Elizardi, G. E. May.

OBITUARIES

JAMES H. CARSON
Miami, Fla.

James H. Carson, formerly owner of Carson Pacific Boiler Service, New York, N. Y., died on October 20 in Miami, Fla. He was 52 years old and living in retirement at the time of his death.

Mr. Carson was born in The Bronx on November 11, 1899, and received his education in schools in the area. He entered the heating business with the Pacific Steel Boiler Co. in 1925, and was employed consecutively as a mechanic, boiler maker, yard superintendent, and sales engineer. He formed the Carson Pacific Boiler Co. soon after the end of World War II and operated the business for several years before his retirement. The Officers and Council extend their sincere sympathy to Mrs. Carson.

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EDMUND J. RITCHIE
Yonkers, N. Y.

Edmund J. Ritchie, vice president and director of Sarco Co., Inc., and a past president of the New York Chapter of ASHVE, died on November 13 in Yonkers, N. Y. He was 62 and had been ill for over a year.

Born in Toronto, Ontario, Canada, Mr. Ritchie received his education at the Toronto Technical School and the University of Toronto. After several years' experience with firms in Canada, he came to the United States in 1915 to join the Sarco Co., Inc., as a sales engineer, and thus began an association which was to last throughout his lifetime.

**E. J. Ritchie
Yonkers, N. Y.**

In addition to being a past president of the Society's New York Chapter, he was also a past president and secretary of the *Steamheating Equipment Manufacturers Association.*

Surviving are his wife, Mrs. Mary Sullivan Ritchie; a son, Edmund S. Ritchie; and a sister, Mrs. Marion Quartermain. The Officers and Council extend their sincere sympathy to Mr. Ritchie's family.

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JOHN A. WILSON
Columbus, Ohio

John A. Wilson, chief engineer, the Armstrong Furnace Co., Columbus, Ohio, died in that city in October. He was 54.

Well known in the heating industry as a research, design, and development engineer, Mr. Wilson was inventor or co-inventor on a number of product improvements during his career.

To acquire his basic experience in the field, he worked for eight years from 1921 to 1929 in the installation and servicing of all types of heating equipment for a number of distributor and dealer organizations. In the latter year, he was employed as a laboratory assistant, by the Silent Automatic Corp., which became the Timken Silent Automatic Division of the Timken Detroit Axle Co. in 1932. He remained with this firm until 1946, rising consecutively to the posts of project engineer and laboratory assistant, when he left to become chief oil burner engineer for the Lennox Furnace Co. He served in that position for approximately two years and then resigned to assume the same duties for the Armstrong Co.

The Officers and Council extend their sincere sympathy.

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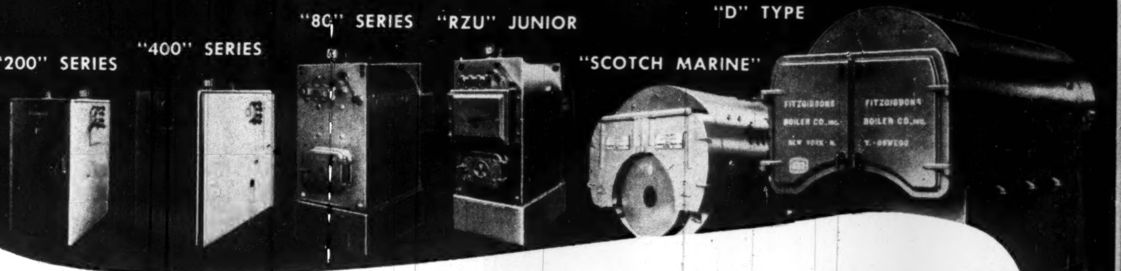
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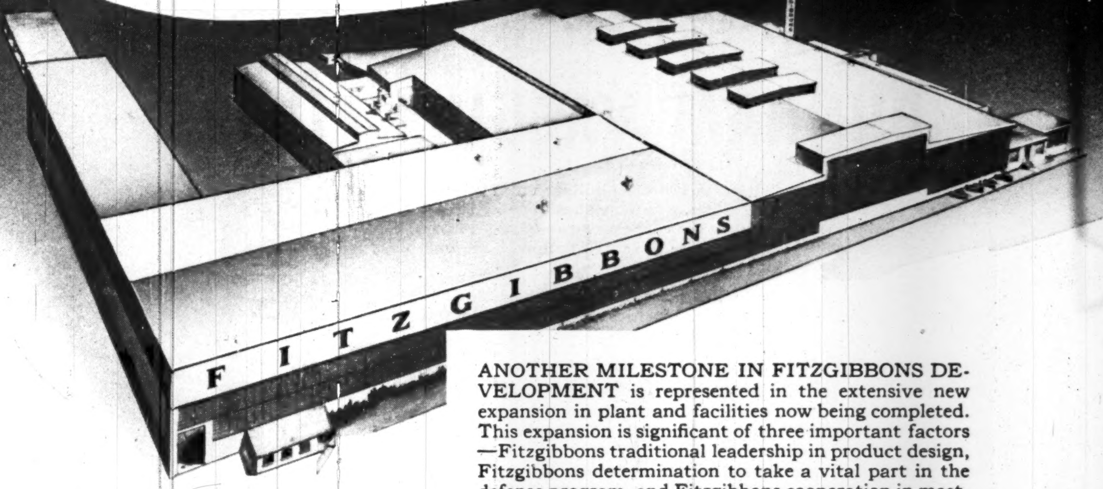
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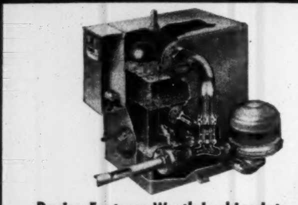

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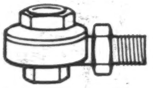

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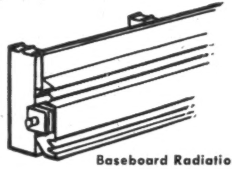

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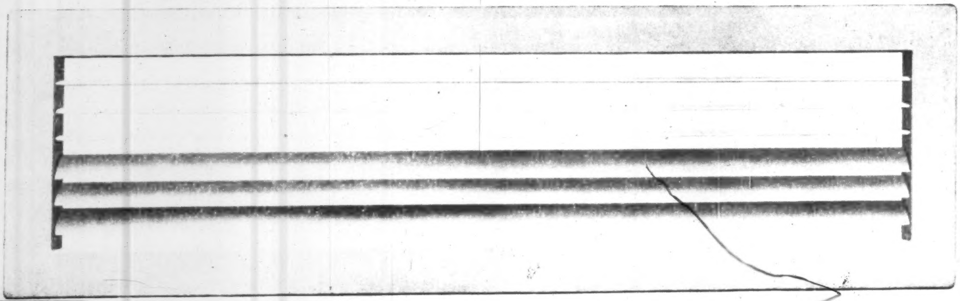
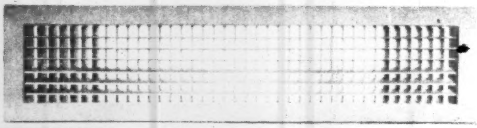


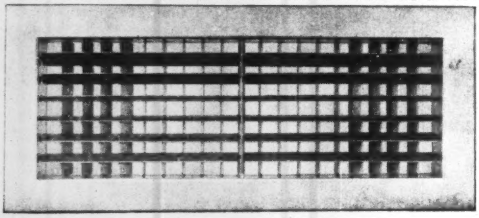
[illegible]

A high-quality, commercial-type grille. One set of individually adjustable AIRFOIL louvers. 3/4" spacing. Two-way diffusion. Concealed support eliminates mullions and unsightly butted construction. Specify L-1 for horizontal louvers - S-1 for vertical louvers. For closer 1/2" spacing, Specify L-7 or S-7.



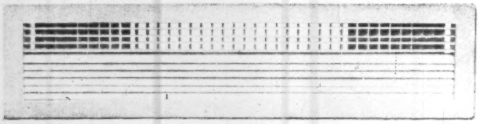
[illegible]

Four-way diffusion with 2 sets of AIRFOIL louvers. Each individually adjustable. Extra deep, smooth as glass AIRFOIL louvers. L-2 features horizontal front louvers with vertical rear louvers. S-2 features vertical front louvers and horizontal louvers in rear.



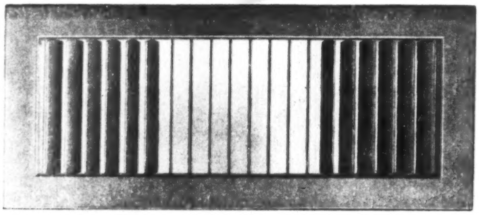
[illegible]

One-piece extra-heavy frame. Air-tight rubber gasket. Individual blade adjustment. AIRFOIL louvers. Wind tunnel tested to give perfect, draft-free distribution. Specify L-270 for horizontal front blades - vertical rear blades, or S-270 for vertical front blades - horizontal rear blades.



[illegible]

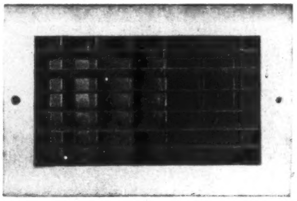
Finer appearance with closer spacing. Front louvers spaced on 1/2" centers. Blades individually adjustable. L-8 features horizontal front louvers and vertical rear louvers. S-8 vertical front louvers, horizontal rear louvers.



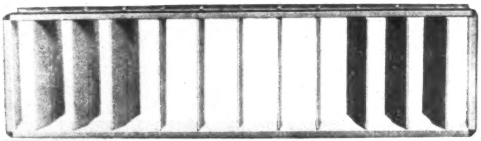
[illegible]

One set individually adjustable AIRFOIL louvers. To be used on applications requiring two-way directional control. Neat appearance, outstanding efficiency. Specify S-271 for vertical louvers, L-271 for horizontal louvers.

[illegible]



COMBINATION GRILLE AND VOLUME CONTROLLER. For exposed duct work. Controls both air VOLUME and 4 - way distribution. Cuts installation time in half - costs 30% less than separate volume controller and grille.



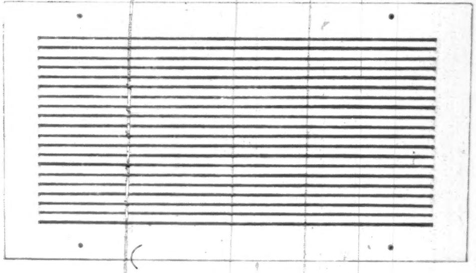
[illegible]

Fits in duct behind grille. Insures even distribution of air. Individually adjustable deflecting blades. Extra-strength rigid frame. Held in place by friction. No screws necessary. Installs quickly - easily.

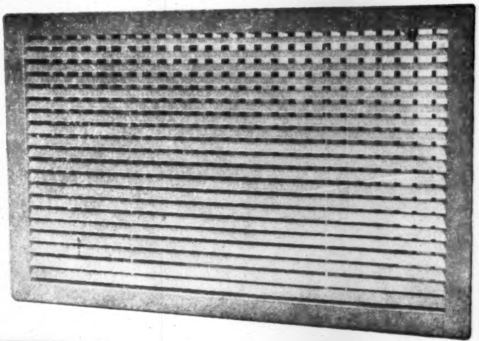
• • • • • • • • *Airfoil* **LEADER IN THE FIELD** • • •

Extra Value .. At Lower Cost

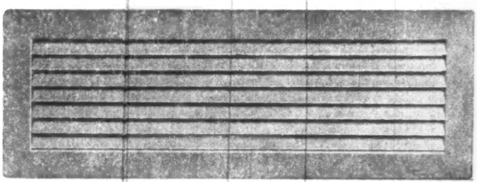
RETURN AIR GRILLES AND REGISTERS



[redacted] The only return-air, fixed, deflection grille of its kind. Blades on 3/8" centers parallel to long dimension or the short dimension. Deep fins have easy curve deflection. Standardized at 0 degrees or 42 degrees. Furnished in special matching colors or standard finish of grey lacquer. Specify RL-21 or RS-21.



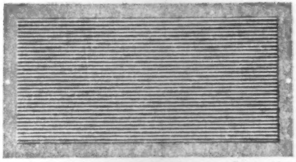
[redacted] Combines return air grille with multi-shutter damper blades in rear. 3/4" spacing in front. Rear blades are 1-1/4" deep, spaced on 1" centers, operated by lever on face of grille. Available also with REMOVABLE LEVER LOCK at no extra Charge. For front blades spaced on 3/8" centers, specify RL-22 or RS-22.



[redacted] Designed to match Airfoil Air Conditioning Outlets. Rugged construction - outstanding appearance. Deep fins with easy curved deflection on 3/4" spacing. Standardized at 45 degrees. Assures efficient, positive air control. Standard border, 1-1/4" beveled. Furnished in special matching colors or standard finish of grey lacquer. Specify RL-230 or RS-230.

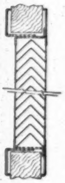
NO-VISION DOOR AND PARTITION GRILLES . . . .

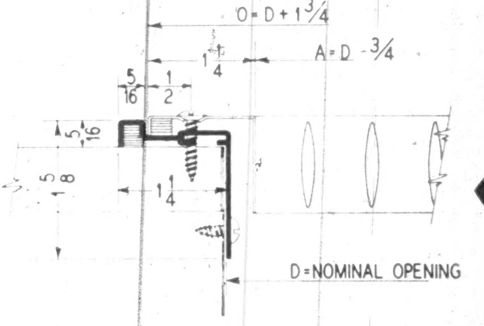
[redacted]



Features flange frame. Available also with channel type frame. Made of strong, all-steel construction. V shaped louvers on 1/2 inch centers set securely in end frames. Mitered corners are reinforced with metal backing. Attractive in appearance. Widely used for exhaust and return air grilles. Available with auxiliary frame as shown in cut right below.

[redacted] Features flange frame. Made of all-steel. V-shaped louvers on .333 inch centers set securely in end frames. There is maximum free area, yet the grilles are completely sight-proof. Mitered corners are reinforced with metal backing. Attractive in appearance. Cut shows auxiliary frame available at extra cost.



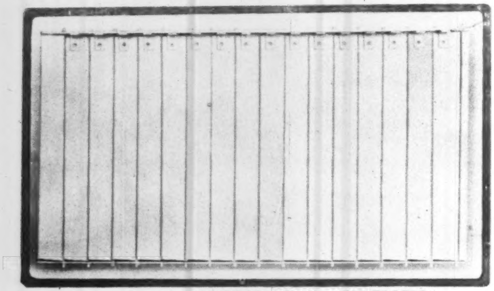


FRAME 115 Allows quick, easy removal for cleaning or adjusting. Can be installed either before or after plastering has been completed. Frame may be imbedded in plaster. Each frame has sponge rubber gasket to prevent air leakage. Edge acts as plaster lock. Designed for use with Titus AIRFOIL registers and grilles only.

Airfoil LEADER IN THE FIELD

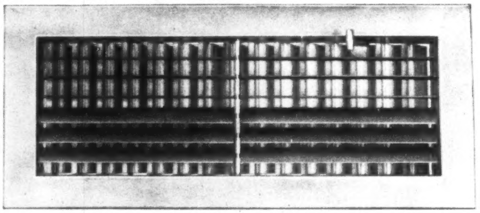
Advanced Design · Greater Flexibility

AIRFOIL MULTI-SHUTTER REGISTERS



(REAR VIEW ILLUSTRATED)

[illegible] Provides instant, positive shut-off of rear blades by inconspicuous adjusting lever on face of grille. Front louvers on 3/4" centers each individually adjustable. Rear shut-off louvers on 1" centers. Specify L-4 for horizontal front louvers vertical damper blades or S-4 vertical front louvers horizontal damper blades.



[illegible] Outstanding register combines AIRFOIL double directional grille with a multi-shutter damper. Positive volume control and shut-off. Operation controlled from face of grille. Features the smooth-as-glass AIRFOIL louvers on 3/4" centers. Available as L-274 horizontal front louvers, vertical damper blades or S-274 vertical front louvers horizontal damper blades.

Removable

LEVER LOCK

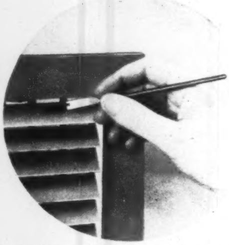
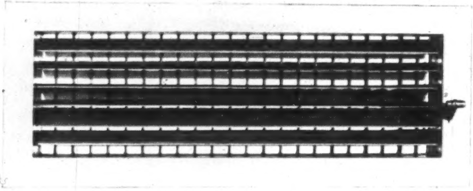
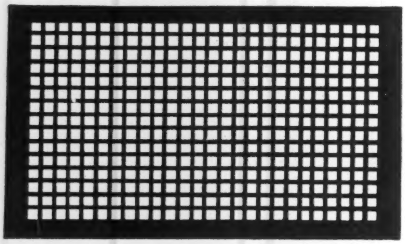


Illustration at right shows the special Titus Removable Lever Lock which prevents unauthorized persons from tampering with the air flow. Note that entire lever is removed, leaving only a small concealed lever slot. Furnished on any Titus AIRFOIL multi-shutter registers as optional at no extra cost.



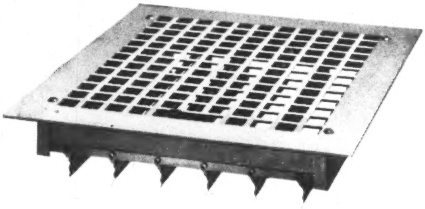
[illegible] Combines 4-way 270 grille with multi-shutter damper. Assures maximum directional control, positive volume control and shut-off. Damper blades interlock. Two front sets of louvers individually adjustable. Spaced on 3/4" centers. Rear shut-off louvers on 1" centers. Specify L-276 for horizontal front louvers or S-276 for vertical front louvers.

Titus Perforated Grilles



Titus perforated grilles are made to order in all standard lattice, 1/2", 5/8", 3/4" and 7/8" as well as many special ornamental designs. Quotations furnished promptly upon application.

Titus Stamped Steel Wall Registers

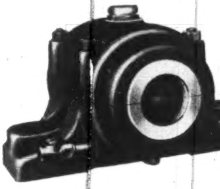


Featuring multiple-valve slide center movement. For use in wall or ceiling. Faces 12 ga. steel with 3/4" square perforations and 1/4" crossbars. Specify T-330.

TITUS MANUFACTURING CORP. WATERLOO, IOWA

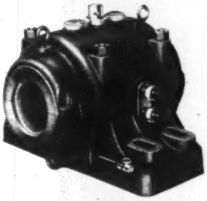
QUIET DODGE BEARINGS

THE MOST COMPLETE LINE FOR FAN AND BLOWER SERVICE



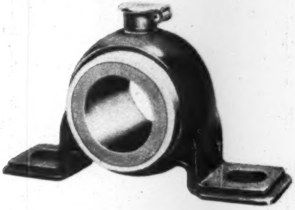
SLEEVOIL PILLOW BLOCK

A precision-built, ring-oiling babbitted bearing, self aligning and exceptionally quiet in operation. Special seals prevent oil leakage and keep dirt out of the bearing.



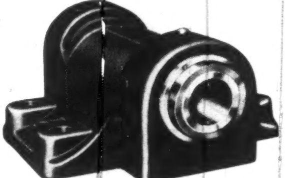
WATER-COOLED SLEEVOIL

Specially designed for applications where elevated temperatures are encountered. Dodge Sleevoil bearings combine quietness with exceptional load carrying capacity; are available in shaft sizes from 1-11/16" to 8".



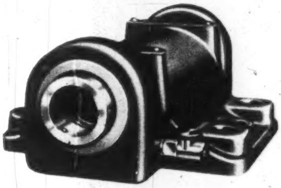
DODGE BRONZOIL

Capillary bronze bushing has capacity of one-third its volume in oil. Reservoir with close fitting wick around bushing provides ample lubrication. Oil resistant grommets available for noise isolation. Sizes 1/2" to 1-1/4".



BALL BEARING PILLOW BLOCK

Single row, deep groove ball bearings. Inner race extended to form sleeve which carries shaft. Piston ring seals retain lubricant, exclude dirt. For arrangement No. 2. Shaft sizes 15/16" to 2-1/4".



BRONZE BUSHED PILLOW BLOCK

Designed for arrangement No. 2 installations. Two bronze bushings of high lead content and T section rings, sealed against dirt. Composition rings inside thrust collar prevent oil leakage. For shaft sizes 15/16" to 2-3/16".

CALL THE TRANSMISSIONEER

your local Dodge distributor, for information about the entire Dodge line of bearings for fan and blower service. Look for his name in the Classified Telephone Directory under "Power Transmission Equipment." Or write to the factory.

DODGE MANUFACTURING CORPORATION
1600 UNION ST., MISHAWAKA, IND.

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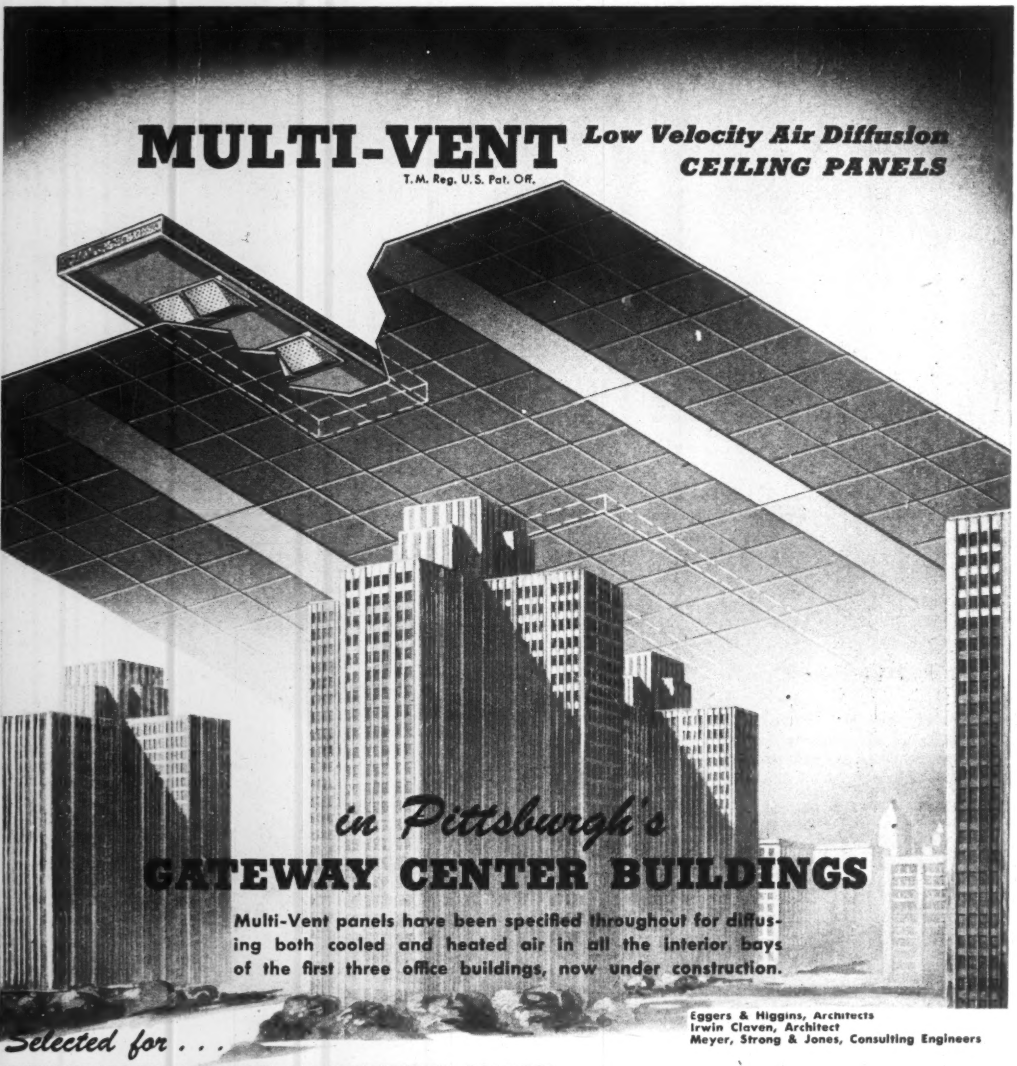
MULTI-VENT Low Velocity Air Diffusion CEILING PANELS

T.M. Reg. U.S. Pat. Off.



in Pittsburgh's

GATEWAY CENTER BUILDINGS

Multi-Vent panels have been specified throughout for diffusing both cooled and heated air in all the interior bays of the first three office buildings, now under construction.

Eggers & Higgins, Architects
Irwin Claven, Architect
Meyer, Strong & Jones, Consulting Engineers

Selected for . . .

TRULY DRAFTLESS, NOISELESS AIR CONDITIONED COMFORT . . .
for over 8000 office workers, summer and winter.

Plus these great advantages possible only with Multi-Vent...

COMPLETE FREEDOM IN LOCATING MOVABLE PARTITIONS
Partitions may even bisect a diffusing panel without disturbing in any way Multi-Vent's incomparable over-all uniformity of room air movement, temperature, and humidity.

COMPLETE FREEDOM IN LOCATION OF LIGHTING FIXTURES . . .
for Multi-Vent panels are completely concealed in standard acoustical ceilings, and in no way interfere with interior design.

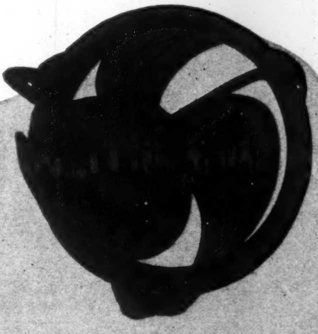
See SWEET's Arch. & Eng. files or write for detailed literature.

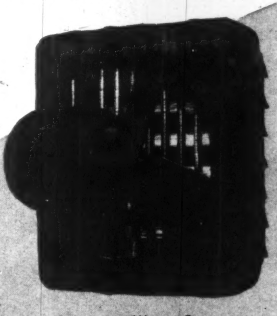
RADIANT PANEL HEATING AND COOLING EFFECT ADDS TO THE COMFORT FACTOR
The large areas of the ceiling which function as distribution plates for the Multi-Vent panels are heated or cooled to the temperature of the supply air.

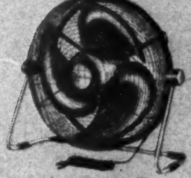
MULTI-VENT DIVISION

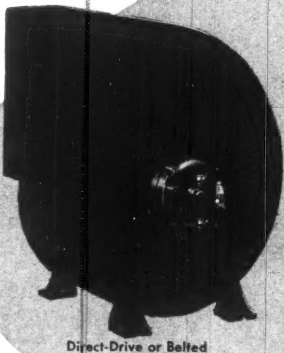
THE PYLE-NATIONAL COMPANY
1373 North Kostner Avenue
Chicago 51, Illinois

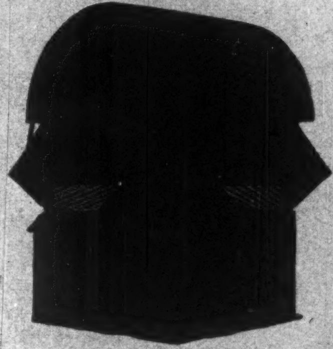
Certified Capacities...
Guaranteed Performance!

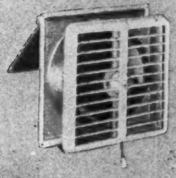

Self-Cooled Motor Propeller Fans


Steam, Hot Water, Gas, Electric Unit Heaters


Home Cooling Fans


Direct-Drive or Belted Centrifugal Fans


"PRV" Power Roof Ventilators


Kitchen Ventilators

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VENTILATING, HEATING EQUIPMENT

Quietest, most dependable equipment you can specify

For your protection, every piece of ILG equipment bears the "One-Name-Plate" Guarantee. This means that each complete unit, including the motor, is covered by a single responsibility. ILG is able to offer this exclusive, broad guarantee oni, because ILG products are designed and built RIGHT to perform RIGHT.

Direct-connection of motor and wheel, special characteristics incorporated into ILG-built motors, electrical balancing of all rotating parts, scientific streamlining, unusual design features determined by laboratory research, testing of each assembled unit before shipment—add up to exceptionally high quality and remarkably long life. Capacity ratings of each unit are certified according to standard test codes of ASHVE, NAFM, PFMA, and IUHA. Decibel ratings verify quietness of operation.

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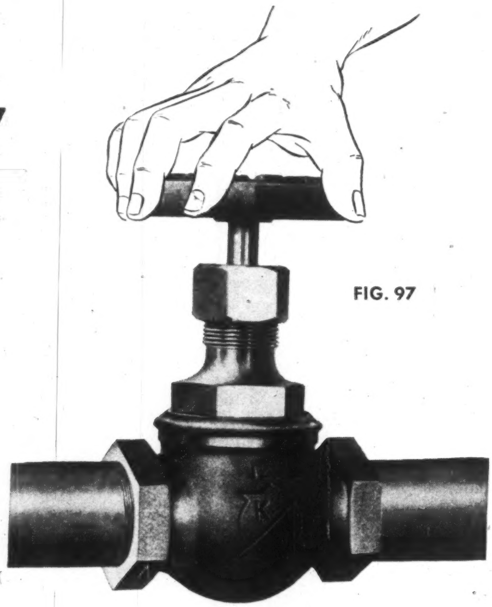

FIG. 97

JOB-FITTED with the *right* disc for every service

FIG. 98

TO ASSURE LONG, TROUBLE-FREE operation with easy maintenance, the complete KENNEDY Line is *job-fitted* . . . every valve specially designed and engineered for the job it has to do.

IN THE KENNEDY FIGS. 97 AND 98, for example, the disc is exactly matched to the job. To meet a wide range of fluid, temperature and pressure requirements, a variety of disc materials is available. Each is carefully selected for the service for which it is recommended.

THE RENEWABLE COMPOSITION DISCS give longer service because the extra height of the raised seats utilizes full thickness of the disc before replacement is necessary. The disc holder swivels on the stem to allow uniform wear on the disc.

THE MOLDED PACKING is self-lubricating and both Fig. 97 and 98 can be readily repacked under full line pressure.

THE HEAVY-WALLED BODIES are ruggedly built with full rounded contour. The stems are made with manganese bronze of 50,000 lb. tensile strength and have unusually heavy threads. Parts are fully interchangeable. Sizes range from ¼ to 3 inches with a working pressure of 125 lbs. saturated steam. WRITE FOR BULLETIN 56.

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THE **KENNEDY** **VALVE MFG. CO.**
ELMIRA, NEW YORK

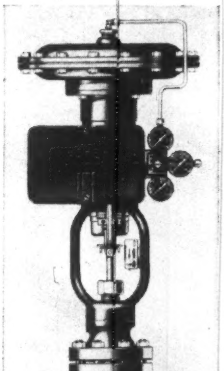
VALVES • PIPE FITTINGS • FIRE HYDRANTS

For Restricted Requirements

3 STANDARD METHODS OF RESTRICTING INNER VALVES

FISHER®

DIAPHRAGM CONTROL VALVES



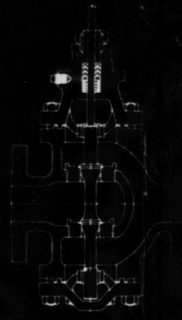
Reasons for using restricted trim: (1) where later conditions require either larger or smaller capacities, (2) a full sized valve body is desired for line strength but with low capacity requirements — Fisher 3 standard methods offer a quick, economical and completely satisfactory way of solving these problems.

Size of restriction available: Restricted Inner Valve ports should be held to minimum size of not less than 50% of standard port diameter for valve body size, or equivalent of 25% of maximum full size valve capacity.

Practical considerations have proven it is undesirable to reduce flow to less than 25% of maximum capacity of body in double ported valves.

FISHER GOVERNOR COMPANY
Marshalltown, Iowa

[illegible]



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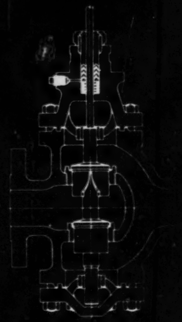

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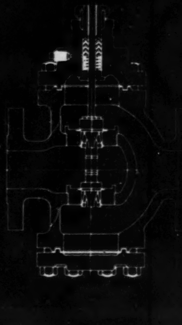
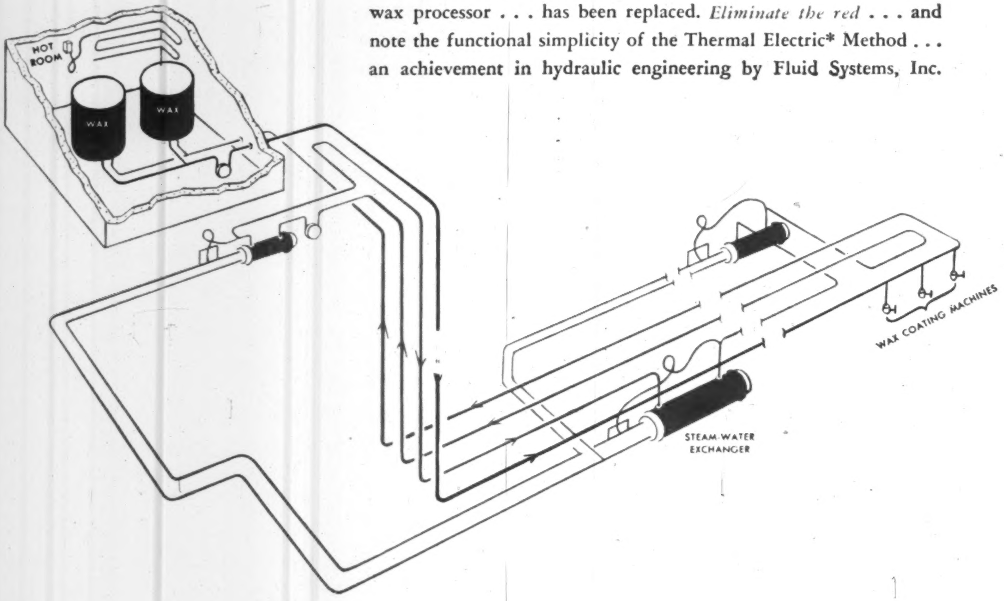


FISHER®

LEADS THE INDUSTRY IN R [illegible]

This system of wax handling . . . developed by the world's largest wax processor . . . has been replaced. *Eliminate the red* . . . and note the functional simplicity of the Thermal Electric* Method . . . an achievement in hydraulic engineering by Fluid Systems, Inc.


HOT ROOM
WAX
WAX
WAX COATING MACHINES
STEAM-WATER EXCHANGER

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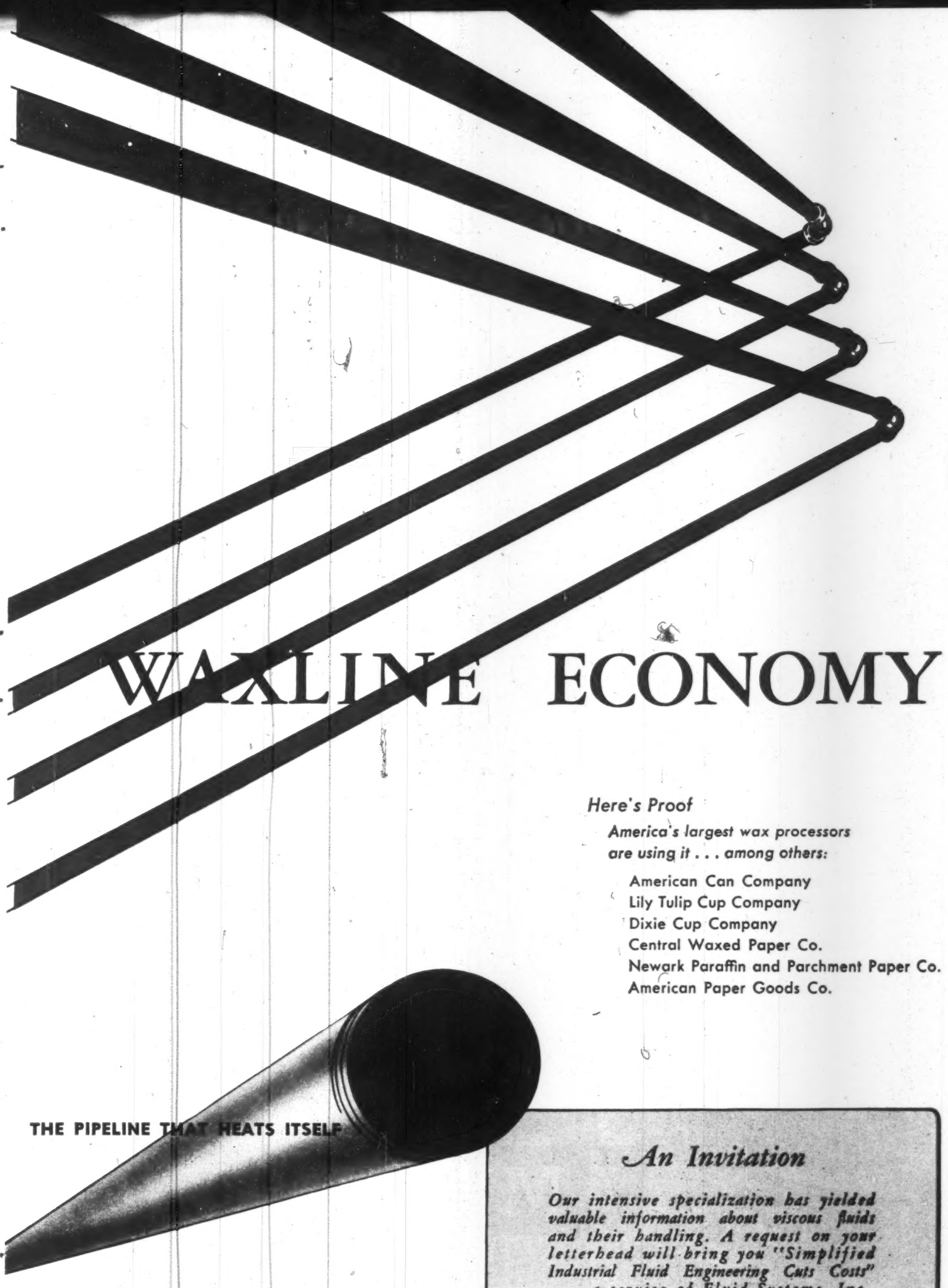

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America's largest wax processors are using it . . . among others:

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THE PIPELINE THAT HEATS ITSELF

An Invitation

Our intensive specialization has yielded valuable information about viscous fluids and their handling. A request on your letterhead will bring you "Simplified Industrial Fluid Engineering Cuts Costs" . . . a service of Fluid Systems, Inc., 1881 Dixwell Avenue, New Haven 14, Conn.

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4 ..FACTS ABOUT CORK for Low Temperature . . .

CORK is one of the most useful materials known to man. Not only has it been in service longer than history can record, but its use has greatly increased with the need for modern industrial efficiency and economy. The reason for this is that Cork is completely unique in its physical structure and qualities. There's *nothing* like Cork!

1. Cork is MONEY-SAVING! Millions of dead-air cells in every square inch of Cork insulation cause it to serve as a most efficient *natural* barrier to heat flow. By its use, refrigeration is conserved to the most practical limits.

2. Cork is LONG-LASTING! Cork has high structural strength and is a most durable material. It continues to serve for many years at highest efficiency.

3. Cork is TIME-TESTED! The use of Cork insulation has kept pace with the development of refrigeration and cold storage. Its wide acceptance in these "heavy-duty" industries is due to its proved record for more than 40 years.

Write for FREE copy of Mundet Insulation Manual

4. Through more than 80 years as Cork specialists, we are able to preserve Cork's natural advantages in Mundet insulating products. Mundet engineers give you responsible assistance in building or expanding low temperature facilities. Let us help you secure low operating cost and maximum service. Mundet Cork Corporation, Insulation Division, 7101 Tonnelle Avenue, North Bergen, N. J.

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CINCINNATI
427 West 4th Street
DALLAS 10
601 Second Ave.
DETROIT 21
14401 Prairie Avenue
HOUSTON 1
Commerce and Palmer Streets
INDIANAPOLIS
56 E. Merrill St.
JACKSONVILLE 6, FLA.
800 E. Bay St.
KANSAS CITY 7, MO.
1700 Brooklyn Ave.
KNOXVILLE 3
1221 Grand Avenue
LOS ANGELES
(Maywood)
6116 Walker Avenue
NEW ORLEANS 16
315-25 N. Front Street
NEW YORK 17
331 Madison Ave.
PHILADELPHIA 39
856 N. 48th Street
ST. LOUIS 9
3176 Brannon Ave.
SAN FRANCISCO 7
440 Brannan Street
WASHINGTON D.C.
600 F Street, N.W.

In Canada:
Mundet Cork & Insulation, Ltd.
35 Booth Avenue, Toronto

Write us for name of our nearest representative if there is no Mundet office in your city.

MUNDET CORKBOARD
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MUNDET CORK PIPE COVERING
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MUNDET
CORK INSULATION

CONSERVES LOW TEMPERATURE

BULLETIN 513
COMET
air-stream unit heater
nyb
THE NEW YORK BLOWER COMPANY
SALES OFFICES 32nd STREET and SHIELDS AVENUE · CHICAGO 16
FACTORY LAPORTE, INDIANA

nyb

Investigate

COMET Unit Heaters

BUILT TO MEET MODERN INDUSTRIAL REQUIREMENTS FOR CONTINUOUS HEATING SERVICE UP TO 150 POUNDS STEAM PRESSURE

Horizontal Type

Ceiling suspension type with heavy duty welded steel fin-and-tube heating element. The rugged arc-welded construction out-performs and outlasts heating elements made of thinner non-ferrous metals. Avoids their expansion-contraction faults, yet has the same BTU efficiency. Ten basic sizes with capacities from 30 Mbh to 490 Mbh. Totally enclosed motors. (Extra heavy non-ferrous coils also available.)

Vertical Projection Type Also Available

For efficient heating from high-ceiling areas—for door heaters over small openings—or where the horizontal type Comet Heater is not applicable. Ten basic sizes; capacities from 27 to 332 Mbh.

●

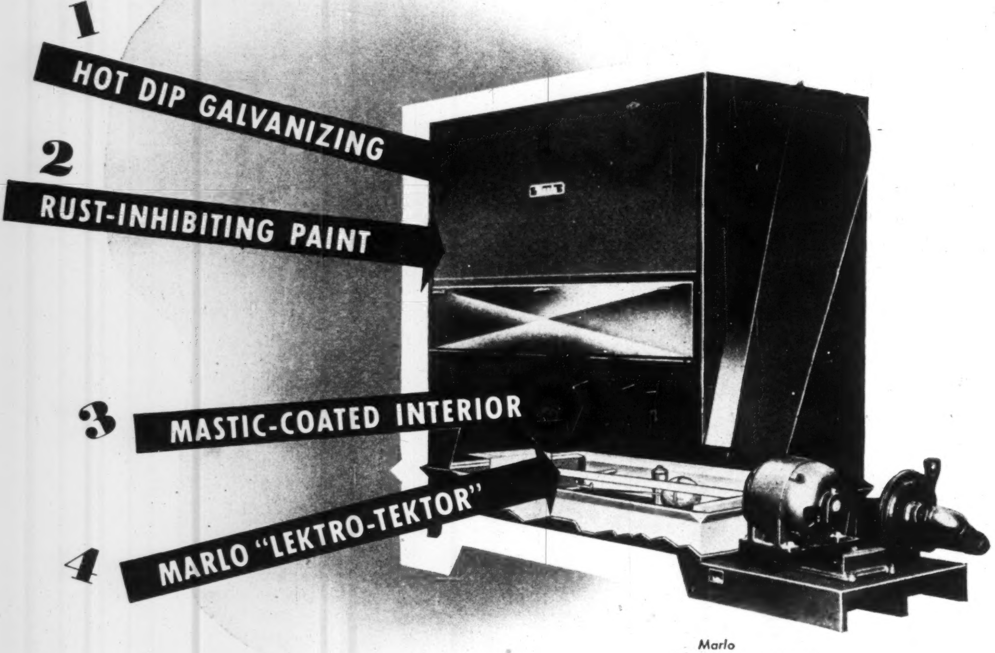
WRITE FOR BULLETINS
No. 513 HORIZONTAL TYPE
No. 484 VERTICAL TYPE

nyb **THE NEW YORK BLOWER COMPANY**

SALES OFFICES • 32nd STREET and SHIELDS AVENUE • CHICAGO 16
FACTORY, LAPORTE, INDIANA

NOW...MORE IMPORTANT THAN EVER

...MARLO QUADRUPLE PROTECTION against CORROSION!



Marlo
Evaporative Condenser

With greater emphasis being placed constantly on *endurance* of equipment, Marlo Evaporative Condensers and Cooling Towers offer this exclusive four-way protection to assure more dependable and longer-lasting installations for you:

OUTSIDE — Marlo galvanized sheets and frames are sprayed with a special rust-inhibiting alkyd resin-base paint that forms an extra front line barrier against corrosive elements.

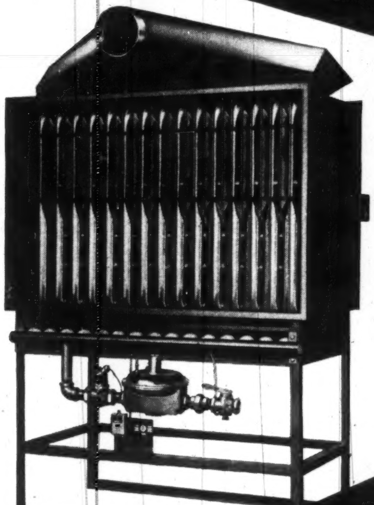
INSIDE—sheets, panels and galvanized parts are coated with a sound deadening asbestos-asphalt mastic that doubles as an efficient corrosion-retardant. Marlo's exclusive "Lektro-Tektor" affords additional internal protection by preventing electrolytic sump tank corrosion.

Write for information on the complete Marlo line.

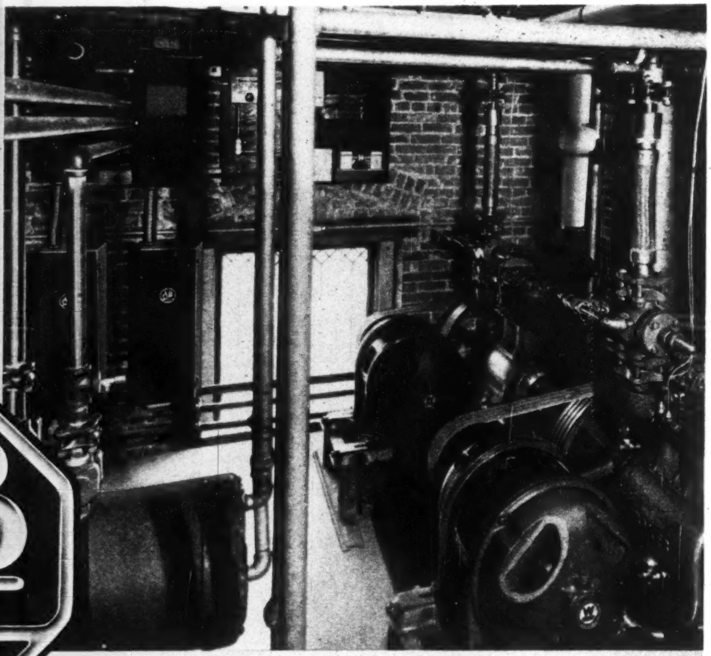
Marlo COIL CO. • 6135 Manchester Rd. • St. Louis 10, Mo.

MANUFACTURERS OF

COOLING TOWERS • EVAPORATIVE CONDENSERS • INDUSTRIAL COOLERS
AIR CONDITIONING UNITS • MULTI-ZONE UNITS • BLAST HEATING & COOLING COILS



MODE



Baker compressors equipped with Allen-Bradley magnetic resistance type starters.

A-B Quality

BAKER

COMPRESSORS

equipped with

ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS

Why are Allen-Bradley starters so popular for refrigeration and air-conditioning service? . . . Because they do not require regular attention; they are trouble free. Only ONE moving part. No pivots, pins, or bearings to corrode or stick . . . no jumpers to break. You install them . . . and forget them!

No contact maintenance . . . Allen-Bradley cadmium silver alloy contacts never need cleaning, filing, or dressing.

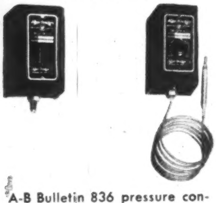
Dependable overload relays . . . Allen-Bradley thermal relays are dependable and remain accurate in their operation, even after long service.

The Allen-Bradley trademark stands for millions of trouble free operations.

Allen-Bradley Co., 1335 S. First St., Milwaukee 4, Wis.

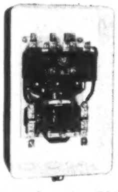
Typical Refrigeration Controls

PRESSURE AND TEMPERATURE CONTROLS



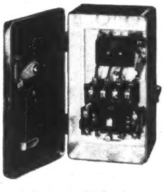
A-B Bulletin 836 pressure control and A-B Bulletin 837 temperature control. Accurate, rugged, compact units.

AUTOMATIC STARTER



A-B Bulletin 709 solenoid starter. Note white interior for ease of wiring.

COMBINATION STARTER



A-B Bulletin 712 disconnect switch type combination starter. Saves installation time.

ALLEN-BRADLEY SOLENOID MOTOR CONTROLS

FOR SALE
FRESH AIR
AT GREATLY
REDUCED PRICES

Include DOREX AIR RECOVERY in your air conditioning or heating plans

Fresh air isn't "for free" in an air conditioning system. It costs plenty to heat or cool. So the secret of economy is: reduce the amount of fresh air that has to be brought in from the outside to maintain air quality inside. Dorex Air Recovery does just that—gives you a real bargain by maintaining fresh air quality with *as little as one-third the normal intake of outside air!*

Dorex Air Recovery "manufactures" *fresh* air from *used* air by removing all odorous and gaseous impurities. The heart of the matter is the remarkable Dorex C Cell with its beds of activated carbon—the most effective air purifier known.

Since with Dorex Air Recovery you have less new air to heat or cool, you need less heating and cooling capacity. This saves both critical material and money—some $400 for every $100 invested in Dorex. And every $1 spent for Dorex maintenance should return a $4 saving in operating costs.

The effectiveness and economy of Dorex Air Recovery have been proved by more than 7,000 installations in the past 20 years. To find out more about Dorex, mail the coupon today.

TRADE MARK "DOREX" REG. U. S. PAT. OFF.

DOREX

Air Recovery

W. B. CONNOR ENGINEERING CORP.
Danbury, Connecticut
Air Diffusion • Air Purification • Air Recovery
In Canada: Douglas Engineering Co., Ltd.,
190 Murray Street, Montreal 3, P. Q.

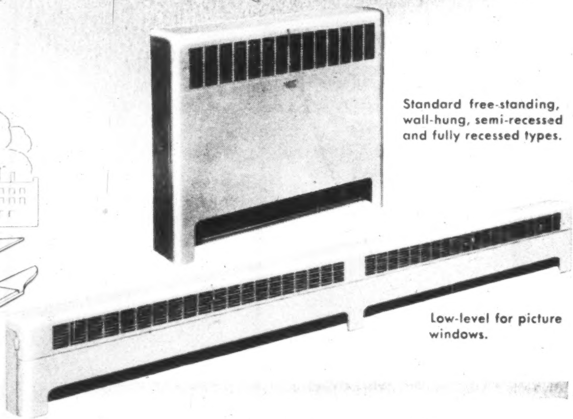
W. B. CONNOR ENGINEERING CORP.
Dept. A-12, Danbury, Connecticut

Please send me, without obligation, full information on Dorex Air Recovery

Name ....
Position ....
Company ....
Street ....
City .... **Zone** ..... **State** ....

1927 · 1952
25
YEARS OF
PROGRESS
IN
HEAT TRANSFER
ENGINEERING
Young Quality ®

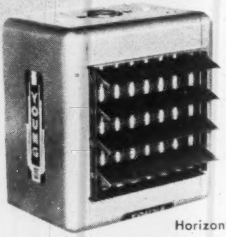
CONVECTORS



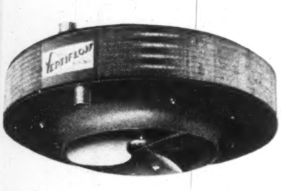
Standard free-standing, wall-hung, semi-recessed and fully recessed types.

Low-level for picture windows.

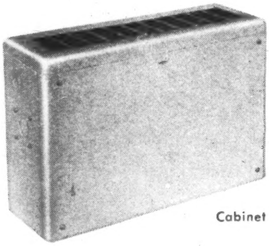
UNIT HEATERS



Horizontal Type

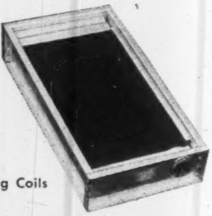


Vertiflow Type



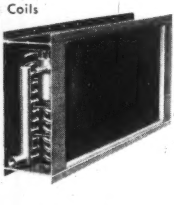
Cabinet Type

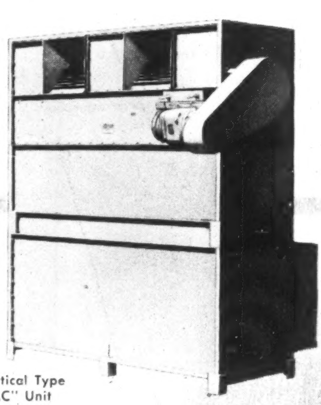
COILS



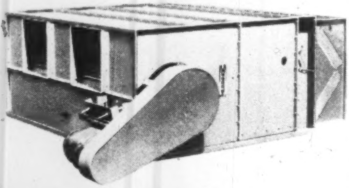
Heating Coils

Cooling Coils





AIR CONDITIONING UNITS



Horizontal Type
"YAC" Unit

Vertical Type
"YAC" Unit

YOUNG

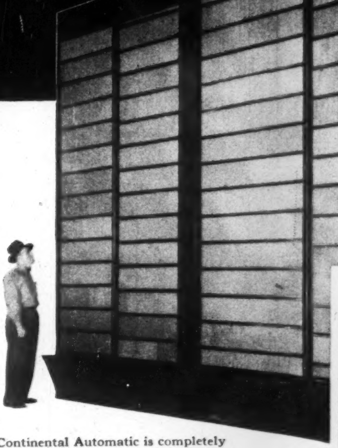
YOUNG RADIATOR COMPANY
DEPT. 512-A, RACINE, WISCONSIN
Factories at Racine, Wisconsin and Mattoon, Illinois
Sales and Engineering Offices in All Principal Cities

Heating, Cooling, and Air Conditioning Products for Home and Industry.

Heat Transfer Products for Automotive and Industrial Applications.

The New CONTINENTAL *Automatic*
SELF-CLEANING AIR FILTER
provides 3 proven and exclusive advantages!

CONTINENTAL



When you figure *total* costs in relation to results, CONTINENTAL is unexcelled. Here's why.

First, CONTINENTAL provides a new type, patented filter media which has honeycomb openings with large, non-clogging air passages (see sectional drawing). Result: a record of unsurpassed efficiency.

Second, CONTINENTAL provides ferris wheel action of filter cells. Moving up and across top of filter, cells are free to rotate around an axis . . . like cars on a ferris wheel (see cutaway drawing). As cells pass from front to back curtain, there is *no reversal of air flow through the filter media.* Result: dirt is not blown back into the clean-air stream.

Third, CONTINENTAL provides positive self-cleaning action. As each cell moves into the cleaning oil, it is held in a semi-horizontal position (see cutaway drawing) until the accumulated dust is soaked loose. It then drops into a vertical position . . . which causes a surge of oil to pass through the filter media, counter-air flow. Result: a thoroughly cleaned filter.

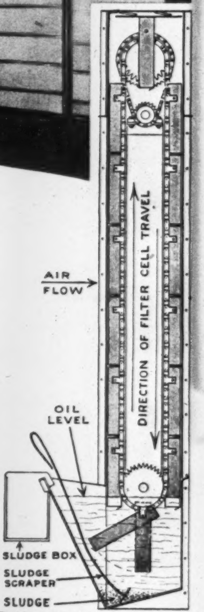
Write for Performance Details

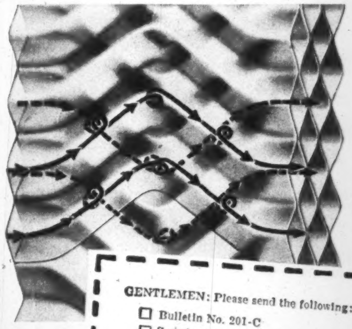
Before you specify or buy, ask us for complete performance data on Continental Automatic Self-Cleaning Air Filters. Use the coupon below. No obligation.

ABOVE: Each Continental Automatic is completely assembled and operated before being shipped.

RIGHT: Cutaway view of Continental Automatic Self-Cleaning filter unit (listed by Underwriters' Laboratories, Inc.) showing filter cell "Ferris Wheel" rotating action and self-cleaning oil bath action.

BELOW: Cross-section diagram of Continental patented filter media showing turbulent air flow, which results in extremely high air-cleaning efficiency and continuous exceptionally low resistance.





For details on Continental Ezwash Air Filters - - - - - - - - **SEE PAGE 75**

GENTLEMEN: Please send the following:
☐ Bulletin No. 201-C
☐ Sample of Ezwash Air Filter Media

NAME ____________________

FIRM ____________________

STREET ____________________

CITY ____________________ STATE ____________

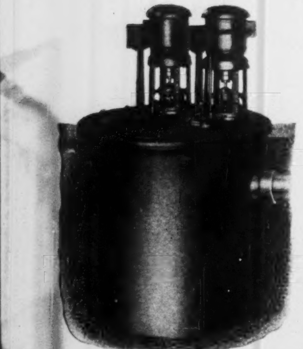
CONTINENTAL AIR FILTERS, Inc.

P. O. BOX 1647 • LOUISVILLE 1, KY.

weil *Condensate Pumps*

ENGINEERED TO SOLVE YOUR PROBLEMS

Specify the pumps engineered to do the best job! There is a **weil** pump for every heating problem and unusual condition. Ratings, receiver capacities and performance of **weil** pumps meet ASHVE standards.

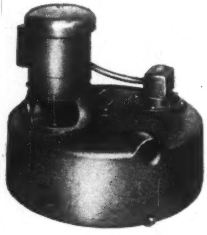


FOR
UNDERGROUND
INSTALLATIONS

NRG

Requires minimum space.

Send for
BULLETIN NRG 200-C
Tells you when to use and how to efficiently install an underground condensate pump.



FOR
LOW PRESSURE
SYSTEMS

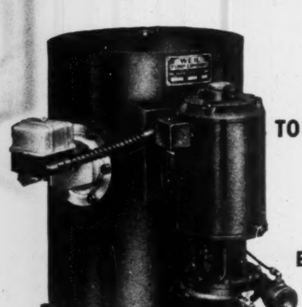
TVC

LOW RETURN
CAST IRON RECEIVER
Capacities to 10000 EDR
Send for
BULLETIN TVC 300-B

Available from Jobbers' Stocks

TVC-29—2000 Sq. Ft. E.D.R., 20# P.S.I.
TVC-35—4000 Sq. Ft. E.D.R., 20# P.S.I.

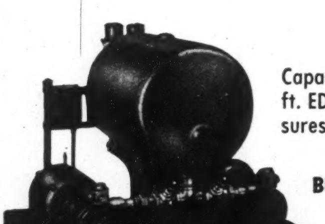
SEND FOR DESCRIPTIVE BULLETINS INTELLIGENTLY DESIGNED TO MAKE PUMP SELECTIONS AND INSTALLATIONS SIMPLE AND EFFICIENT



FOR
CAPACITIES
TO 50000 SQ. FT. EDR

SRC

Send for
BULLETIN SRC 450



FOR
HIGH AND LOW
PRESSURE
SYSTEMS

TR

Capacities to 150,000 sq. ft. EDR and discharge pressures to 125 lbs.

Send for
BULLETIN TR 100-D

THE EFFICIENCY OF YOUR HEATING PLANT IS DEPENDENT UPON EFFICIENCY AND DEPENDABILITY OF YOUR CONDENSATE RETURN PUMP

weil PUMP CO.
1522 N. FREMONT ST. CHICAGO 22, ILL.

weil
Dependable
PUMPS

IN SWEET'S
1951-1952

When winter goes south... Spang 'CW' pipe brings summer inside this school–

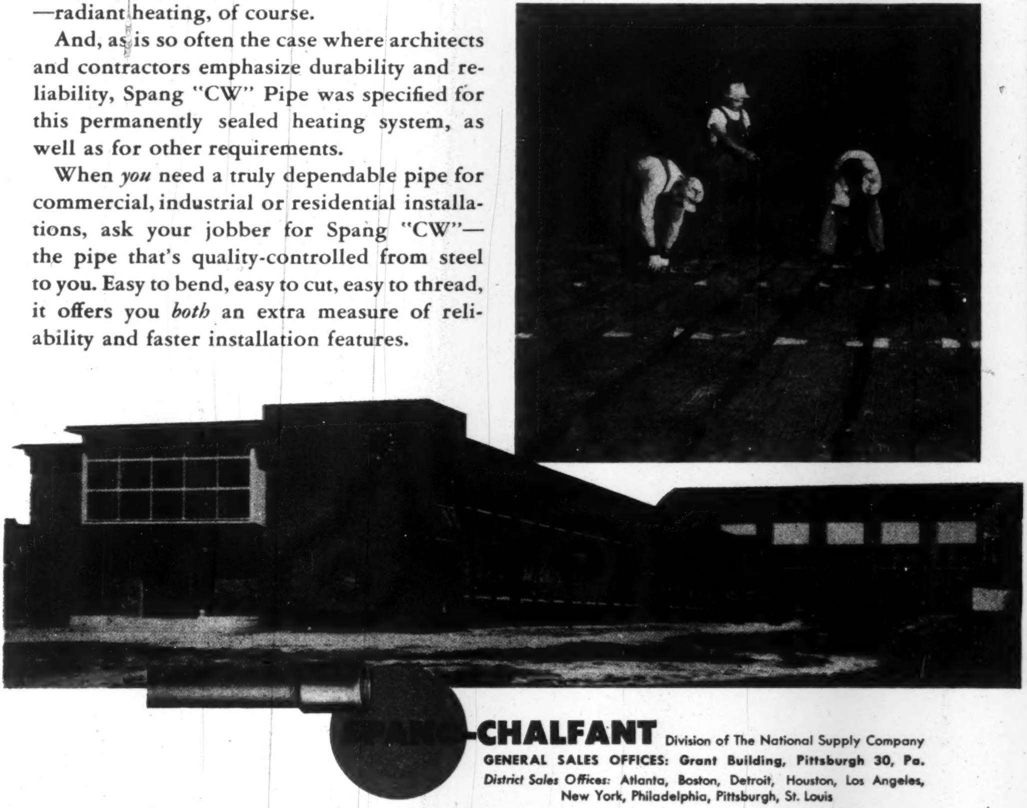
Even in sunny Macon, Georgia, winters can be cold and uncomfortable at times. So, when this Junior High School for Girls was designed with full facilities for modern teaching, it was also planned for modern heating —radiant heating, of course.

And, as is so often the case where architects and contractors emphasize durability and reliability, Spang "CW" Pipe was specified for this permanently sealed heating system, as well as for other requirements.

When *you* need a truly dependable pipe for commercial, industrial or residential installations, ask your jobber for Spang "CW"— the pipe that's quality-controlled from steel to you. Easy to bend, easy to cut, easy to thread, it offers you *both* an extra measure of reliability and faster installation features.

Remember . . . the Spang trademark is a guarantee of greater satisfaction *to you* as well as to your customer.

Architect: MacEwen, Hall & Ferguson, Macon, Georgia; *Engineers:* Bloomfield Engineering Co., Macon, Georgia; *General Contractor:* Amerson & Freeman, Macon, Georgia; *Plumbing & Heating Contractor:* Hancock Plumbing Co., Macon, Georgia



SPANG-CHALFANT Division of The National Supply Company
GENERAL SALES OFFICES: Grant Building, Pittsburgh 30, Pa.
District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

THESE FIVE SIMPLE STEPS

make a solder-joint!

Properly soldered connections between Chase Solder-Joint Fittings and Chase Copper Water Tube are exceptionally strong and pressure-tight. Assemblies of ½″ Chase Copper Water Tube and Solder-Joint fittings have withstood over 3,400 pounds pull, and 5,000 pounds water pressure per square inch. Jobs last longer, and look better, with Chase Copper Water Tube and Solder-Joint Fittings.

Chase BRASS & COPPER

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

• *The Nation's Headquarters for Brass & Copper*

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Send the coupon for folders on Making Solder-Joint, and Flared connections with Chase Copper Water Tube.

Chase Brass & Copper Co.
Waterbury 20, Conn.
Dept. HPA152

Please send me free folders on How To Make Solder-Joint and Flared connections.

Name______________________________
Position____________________________
Firm_______________________________
Address____________________________
City_________________________ State________

1

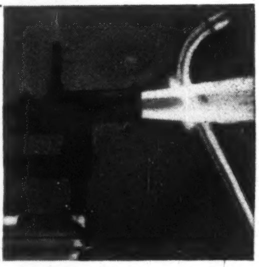
Polish the outside of the tube and inside of the fitting with No. 00 steel wool or fine grade sand cloth.

2

Apply thin coat of flux to tube and inside of fitting. Place fitting on tube and remove excess flux.

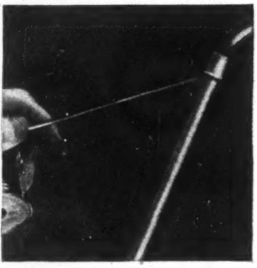
3

Heat joint evenly with a blow-torch. Remove flame and apply solder to joint. Solder will melt from wire at correct temperature.



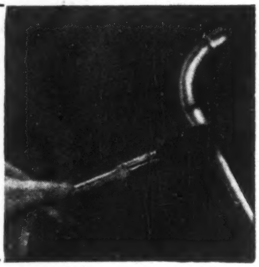
4

Capillary attraction draws solder into joint. When solder shows around edge of fitting, connection is completed.

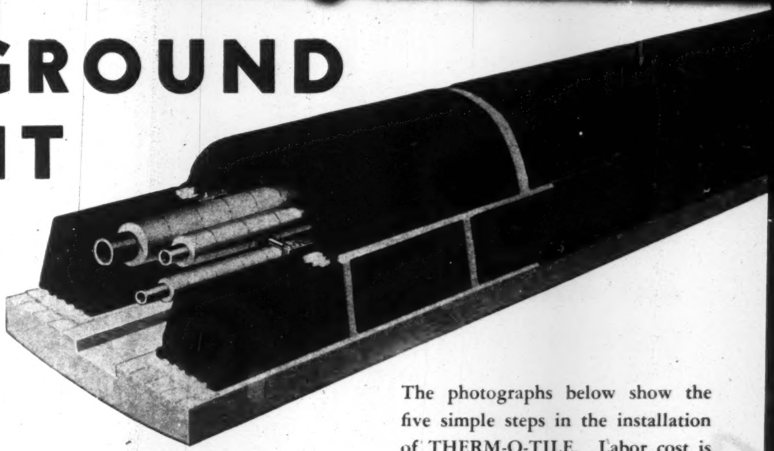


5

Remove excess solder with a brush. Do not place any strain on the joint until it has cooled.



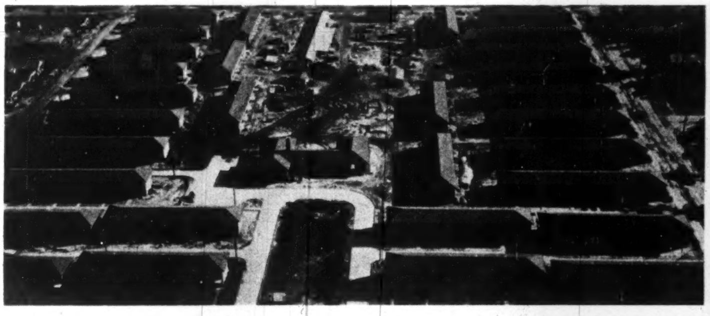
UNDERGROUND CONDUIT *for* STEAM LINES



Therm-O-Tile

REG. U.S. PAT. OFF.

The photographs below show the five simple steps in the installation of THERM-O-TILE. Labor cost is kept low. Interference between different groups of mechanics is prevented — thus excavators, conduit men, and pipe fitters can carry on their work as a continuous operation without interruption from, or waiting for other mechanics.



All of these buildings of the S. Jervay Place Housing Development, Wilmington, N.C., are heated by steam conveyed from the central heating plant through Therm-O-Tile.

The Porter-Hayden Companies, nationally known Insulation Engineers and Contractors, have installed many miles of Therm-O-Tile under widely varying conditions — from California's climate to Alaska's. We will gladly furnish recommendations, estimates of cost, and complete specifications for the conduit and insulation on any underground pipe line project upon request.

JOHNS-MANVILLE. Therm-O-Tile is represented by Johns-Manville Technical Service Units in all principal cities.

BULLETIN 511. This new bulletin contains complete data and numerous Therm-O-Tile installation photographs. Ask for a copy.

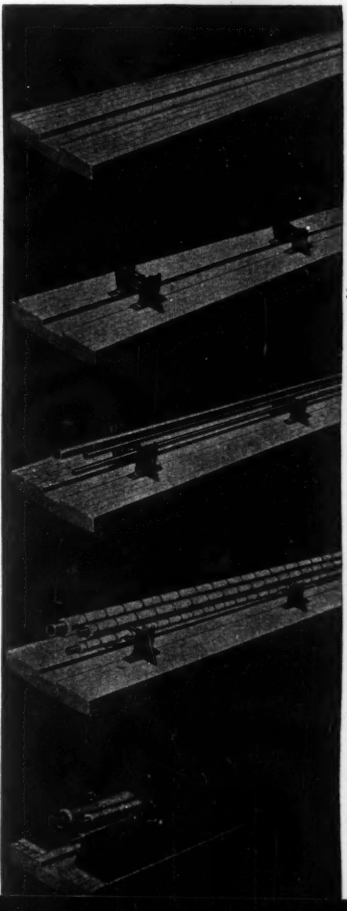
H. W. PORTER & CO., INC.

822-H Frelinghuysen Avenue • Newark 5, N. J.

REID HAYDEN, INC.

BALTIMORE, MD. RICHMOND, VA. CHARLOTTE, N. C.

Insulation Engineers & Contractors



First ☞ **Pour the Base**

Second ☞ **Place the Pipe Supports**

Third ☞ **Install the Piping**

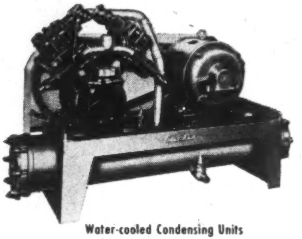
Fourth ☞ **Insulate the Piping**

Fifth ☞ **Install the Base and Arch Tile**

Curtis

DISTRIBUTORS

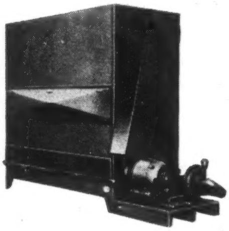
ARE MAKING MANY INSTALLATIONS IMPORTANT TO DEFENSE



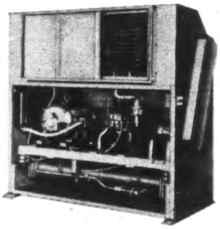
Water-cooled Condensing Units
—through 40 tons

in

- **Army, Navy, Air Force Projects,**
- **Industrial Processing,**
- **Research Laboratories,**
- **Commissaries,**
- **Storage Plants—Food, Biological, Chemical**



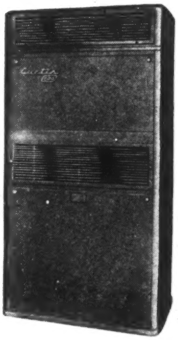
Evaporative Condensers,
Cooling Towers and
Air Handling Units to match



Central Type—
10-15 ton

The broad CURTIS line of Air Conditioning, Temperature and Humidity Control equipment enables CURTIS distributors to *quote* and *get* many of these installations.

With Condensing Units through 40 HP . . . Evaporative Condensers . . . Cooling Towers and Air Handling Units to match, CURTIS distributors can handle *more* jobs, make *greater profits.*



Package Type—
2-4-6-8 ton

Some Franchises are Open. Pin this coupon to letterhead and mail for complete information

Curtis
REFRIGERATION
AIR CONDITIONING
COMMERCIAL

Curtis Refrigerating Machine Division
of Curtis Manufacturing Company
1950 Kienlen Avenue • St. Louis 20, Missouri

I am interested in exclusive Curtis Franchise. Send complete details.

Name____________________________________

Street___________________________________

City________________________Zone_____State_______

98 Years of Successful Manufacturing Experience is "Built-In" Curtis Equipment

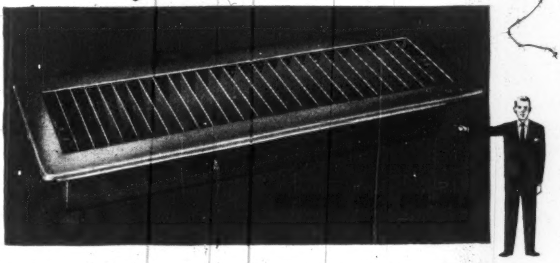
Standard is always first with the finest

here it is...
the floor register everyone wants!

STANDARD'S NEW PERIMETER FLOOR REGISTER

with Standard's exclusive

Dialamatic Control



Standard's new, exclusive dialamatic control gives you POSITIVE HEAT CONTROL. The set screw arrangement means easy balancing, trouble-free operation!

SPECIFICATIONS

The blades of model PH-142 are fabricated of 16 gauge steel, the blades are set in a fixed-fan angle degree for even deflection. The Frame is of one piece, 18 gauge steel construction. The Louvre box fabricated of 16 gauge steel. Packed one to a box, and 20 to a master carton. Comes handsomely finished in gleaming, durable metallic-lustre finish.

Duct opening	Overall of Louvre Box	Overall of Face	Open Area	Depth of Box
2¼" x 14"	2⅛" x 13¾"	3¾" x 15⅜"	80%	2⅛"

THE NEW, IMPROVED *multiple valve* REGISTER

Has Horizontal Multiple Valve Louvres, and $\frac{3}{16}$" turned down edge for flush sidewall installation. The attached sponge rubber gaskets are an *extra* feature that prevents escape of air and chipping of wall surface. The Louvres are adjustable so that the flow of air may be directed either downward, straight forward, upward, or to complete shut-off.

MEMBER
NATIONAL WARM AIR HEATING
INDOOR COMFORT
AND AIR CONDITIONING ASSOCIATION

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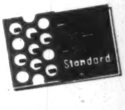
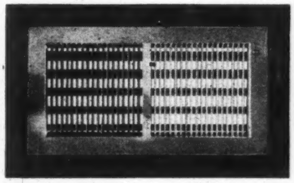


No cost or obligation to you

Standard Stamping and Perforating Co.
3151 West 49th Place—Chicago 32, Illinois



MODEL NO. 331

Metallic Finish standard finish on this style

Write now for Standard's Free Pocket Catalogue

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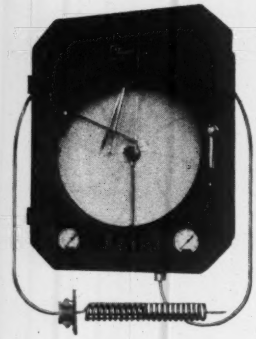
ADDRESS__________ CITY______ ZONE______ STATE______
COMPANY NAME______________________________



TAYLOR FULSCOPE* TEMPERATURE CONTROLLER

Regulates diaphragm valves and lever motors for operation of dampers, etc., to make your air conditioning system work smoothly. Automatically compensates for load changes. Controls refrigeration compressors. Gives you automatic seasonal changeover.

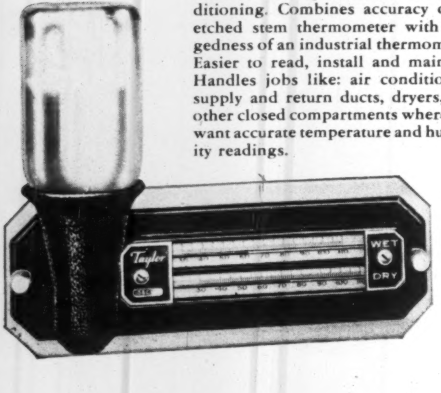
What's *your* air conditioning control problem?

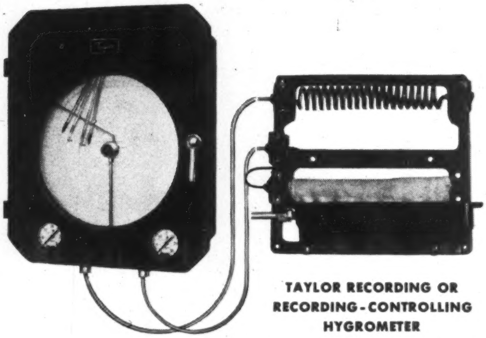
Do you need a single control instrument for an isolated application? Or complete controls for a complete air conditioning system?

Taylor makes a full line of accurate control instruments for every air conditioning need. We'll be glad to work with you or your consulting engineers or contractors to give you the instruments best suited to your individual problem. Ask your Taylor Field Engineer or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

TAYLOR 10BG HYGROMETER

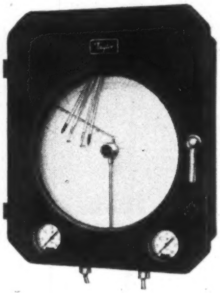
With bottle-fed reservoir. Perfect for more accurate spot checks on air conditioning. Combines accuracy of an etched stem thermometer with ruggedness of an industrial thermometer. Easier to read, install and maintain. Handles jobs like: air conditioning supply and return ducts, dryers, and other closed compartments where you want accurate temperature and humidity readings.





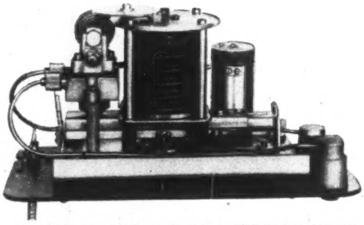
TAYLOR RECORDING OR RECORDING-CONTROLLING HYGROMETER

With continuous water feed. Ideal where air circulation is good, and panel is well located within apparatus, room or duct for best circulation across bulbs. Available with constant level or bottle-fed water reservoir.



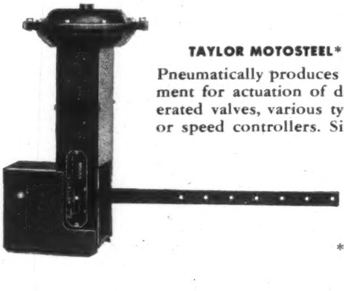
TAYLOR FULSCOPE* RATIO RECORDING CONTROLLER

Ideal where you need control in one medium in a definite relationship to some other variable medium . . . such as inside temperature control in summer air conditioning according to variable outdoor temperatures.



TAYLOR TRANSAIRE* TEMPERATURE TRANSMITTER

New force-balance pneumatic transmitter that meets all normal air conditioning requirements with Simple Operation, Positive Transmitting action and Rapid Response to Temperature Changes. Ideal where zones are remotely located from centralized control room.



TAYLOR MOTOSTEEL* LEVER MOTOR

Pneumatically produces a thrusting movement for actuation of dampers, lever-operated valves, various types of governors or speed controllers. Simple, low-priced.

* Registered Trade-Mark

Safe Moisture and Fume Removal

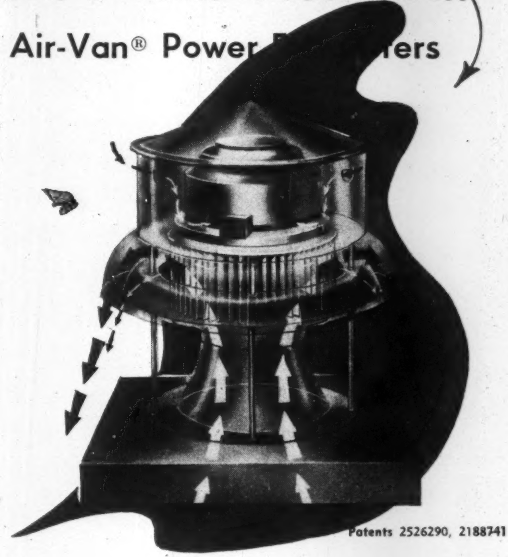
with Gallaher Air-Van® Power ers

- **POSITIVE**
- **ECONOMICAL**

Check for these

Nine Vital Points

. . . before you buy or specify any roof ventilator



Patents 2526290, 2188741

Certified Ratings

Gallaher performance data is the result of tests by an independent laboratory under the direction of nationally recognized authority. Tests show that interpolated data in many cases can be grossly inaccurate.

A Safe System of Fume Handling

Motor must be out of the air stream in order to handle contaminates. Air-Vans are designed so that fresh, clean air is constantly drawn through the motor hood creating a *positive air seal-off** around the motor shaft to prevent passage of fumes into motor housing while the unit is in operation. This eliminates costly special motors.

Scroll Effect*

Gallaher research tests show conclusively that you cannot have maximum efficiency beyond ¼" static pressure with a centrifugal roof exhauster unless scroll effect is present. Air-Vans are the ONLY power roof exhausters with this feature.

Direct Connected

Unit occupies waste roof space with the resultant economy of installation. No belt drives to maintain, no penthouse and only two bearings to lubricate. No backdraft dampers required.

Completely Weatherproof

Air-Vans are designed with overlapping umbrella outlets which are weatherproof under the most extreme conditions, even shipboard deck applications.

Rugged Construction

Air-Van specifications are available for comparison with any competitive unit.

Low Noise Levels

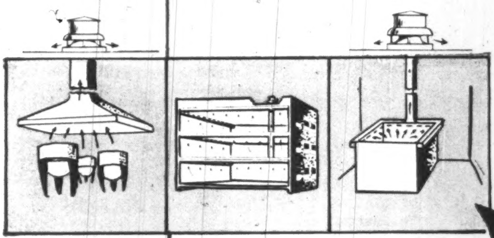
Special streamlined inlet eliminates turbulence. Decibel ratings will show the Air-Van to be an extremely quiet unit.

Available in Special Metals

Air-Vans can be purchased in steel, stainless steel, monel, copper, aluminum and in suitable resistant finishes.

Low Silhouette

Unobtrusive, low silhouette design. The largest Air-Van stands 39 inches from base to top.



The Gallaher Company also manufactures famous low silhouette "Air-Max" Power Exhausters for installations where moisture and fumes are not a factor. Capacities to 50,000 CFM.

CAPACITIES

150 to 11,000 CFM

Static Pressures to 1¾"

*Patented features.

THE GALLAHER COMPANY
4108 Dodge Street
Omaha 3, Nebraska

Gentlemen:

Please send catalog and full information.

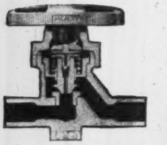
Name..

Address..

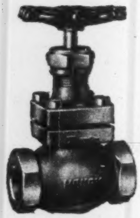
City..State..

The GALLAHER Co.

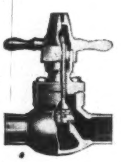
Omaha, Nebr. Owatonna, Minn.



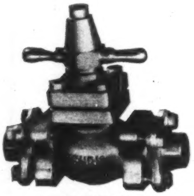
PACKLESS VALVE
With balanced-action



AMMONIA VALVE
Bolted Bonnet — screw or flanged connections. Also with screwed bonnet, sizes 1" and under



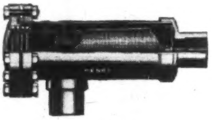
WING CAP VALVE
Non-ferrous



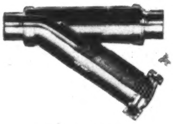
WING CAP VALVE
Semi-steel—with companion flanges and adapters

HENRY VALVE CO.
CONTROLLING FLOW
SINCE 1914

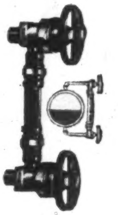
you pay— *no premium for..* the extra advantages found in *Henry products* or for the extra satisfaction that follows their use



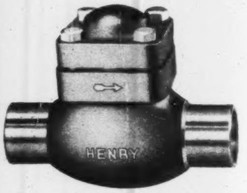
STRAINER
Angle type with patented distortion-proof flange



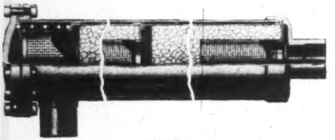
Y-STRAINER
Brass plated. Welded steel construction with forged brass connections. Size ⅝" O. D. S. through 4⅛" O. D. S.



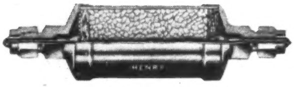
BALANCED-ACTION PACKLESS LIQUID LEVEL GAUGES
Valves are backseating—diaphragms may be inspected or replaced without loss of liquid. Conforms with all safety code requirements.



CHECK VALVE
Piston Type For Freon. Sizes ⅜" through 4⅛" O. D. S.



DRIER
Cartridge type with dispersion tube



EXTRA CAPACITY DRIER
2 cubic inches more than established practice. Forged brass end caps.

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No. 100 Packless and packed valves, strainers, driers, ammonia valves, check valves, relief valves, three-way valves, scale traps, liquid gauge sets, flange unions, nut unions and accessories for air conditioning and refrigeration and industrial uses.

No. 70 Drop forged and cold rolled steel fittings.

DIAPHRAGM RELIEF VALVE
Large capacity—fast positive relief and reseating action. Very small differential between opening and closing pressures.

STRAIGHT-THROUGH RELIEF VALVE
Large capacity—All Brass Construction. Sizes ¼" M.P.T. through 1" F.P.T.

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VALVES • DRIERS • STRAINERS • CONTROL DEVICES and ACCESSORIES FOR REFRIGERATION and AIR CONDITIONING and INDUSTRIAL APPLICATIONS

HENRY VALVE COMPANY

MELROSE PARK, ILLINOIS (Chicago Suburb) • Cable: HEVALCO, MELROSE PARK, ILLINOIS

Here's a new ceiling air diffuser that is fully adjustable, yet maintains a constant diffusion pattern. It offers

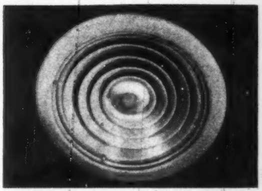
TWO BIG FEATURES

1. Only the Flexiflo has infinitely variable effective area so that air delivery can be varied from near zero to full output without changing the characteristic air pattern. Adjustability is achieved by turning the center knob. This makes it quick, easy and simple to balance the system. Air continues to flow in a stream parallel to the ceiling.

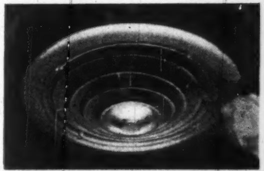
2. Exclusive built-in, self-contained equalizing deflectors that are easily adjustable, after being installed.

These special Flexiflo features are built into a quality diffuser—at a mighty attractive price.

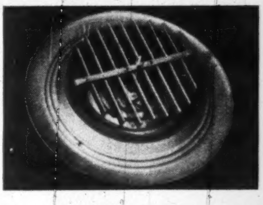
Write for the Flexiflo Engineering Manual and Prices.



Showing the Flexiflo in closed position.



The blades of the equalizing deflector are adjusted after the diffuser has been installed; no special tools required — just a screwdriver.



Rear view of Flexiflo, showing equalizing deflector attached directly to main crossbar. Blades are individually movable and remain fixed in any position to direct and equalize air flow. They can also be used to restrict the volume where a large reduction in neck velocity becomes necessary after installation.

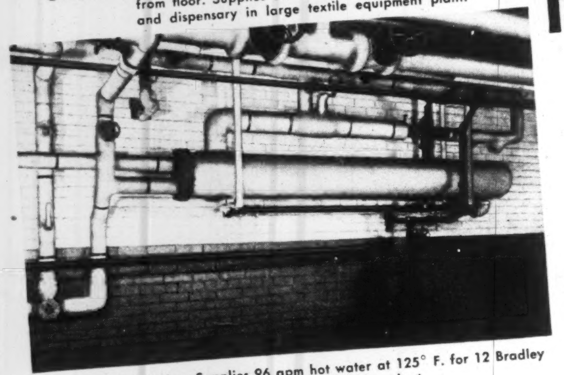
The unique, high aspirating action of the Flexiflo eliminates objectionable drafts, and prevents air stratification, thereby rapidly equalizing the temperature.

FLEXIFLO

UNIVERSAL DIFFUSER CORP.

890 WHITTIER STREET · NEW YORK 59, N. Y.

OVERHEAD installation of GENERAL Instantaneous Heater. 12 feet from floor. Supplies all hot water for washroom, cafeteria and dispensary in large textile equipment plant.



WALL installation. Supplies 96 gpm hot water at 125° F. for 12 Bradley wash fountains in leading metal working plant.

More efficient Hot-Water Supply *that needs no floor space!*

Get NEW COMPLETE CATALOG 60!

This 12 page catalog is packed with profitable ideas for industrial plants. Describes complete GENERAL line: instantaneous water heaters, converters, coil heated tanks, and other equipment.

Complete sizing data, steam consumption tables, photographs and diagrams are included to simplify selection and installation.

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General Fittings Co.
Dept. A., 123 Georgia Ave., Providence 5, R. I.

Please send me your new, complete Catalog No. 60 of industrial water heating equipment.

Name ……………………………………………

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Wherever space is available — near the ceiling, on the wall, in a corner — that's where you can install GENERAL Instantaneous Heaters. You don't have to crowd your boiler room, or subtract from valuable production area.

The many advantages of these compact water heaters are especially important today in helping you meet increased hot water requirements at minimum cost. There's no bulky tank, no excavation, no complicated piping. You save money on both installation and operation. Water is heated instantly and continuously by steam supplied through shell.

GENERAL Instantaneous Heaters are available in 21 sizes with capacities to 300 gals. per minute. Mail coupon today for complete information.

GF

Nothing but the cleanest and finest!

COCA-COLA OFFICE and BOTTLING PLANT, DuQuoin, Ill.

®Janitrol

***Gas-Fired* Unit Heaters Serve Every Department**

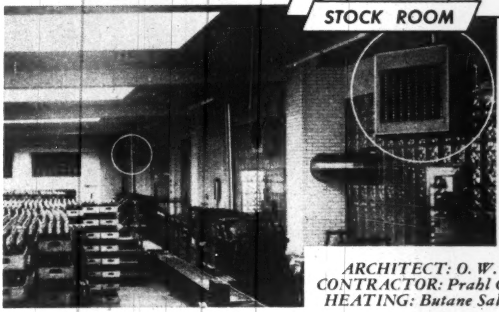
BOTTLING ROOM

In this typically spotless, 1½ million dollar Coca-Cola building, 45 Janitrol Unit Heaters deliver dependable, clean, automatic gas heat where it is wanted . . . when it is wanted.

The complete Janitrol line of sizes and model types made it practical to standardize on Janitrol throughout the entire plant . . . for instance, a corner of the stock room only required a 50,000 Btu/hr. unit while a 450,000 Btu/hr. blower heater was required in the huge basement storage rooms.

In large or small industrial and commercial buildings of all types, in schools and churches, Janitrol Unit Heaters, year after year add to their proven record of unmatched performance.

OFFICES



STOCK ROOM

MAIN GARAGE

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CONTRACTOR: Prahl Construction Co., St. Louis
HEATING: Butane Sales Service, Centralia, Ill.

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Surface Combustion Corporation · Toledo, Ohio
Offices in Principal Cities

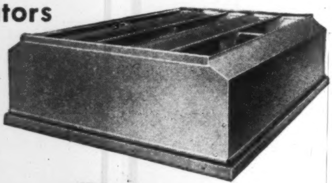
Swartwout

Gravity and Powered

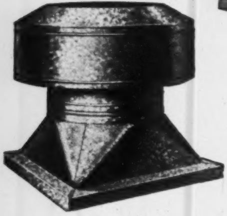
Roof Ventilators
and Ventilating Louvers

This picture catalog of Swartwout Products reminds you that equipment for efficient ventilation of industrial, commercial and institutional buildings is available from *one convenient source* — experienced ventilator manufacturers since 1904. Representatives in all principal cities are ready to help you select the best and most economical installation for your requirements.

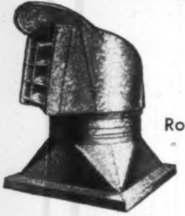
Gravity Ventilators



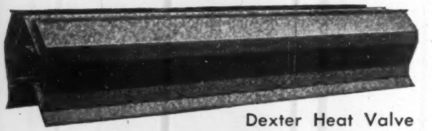
Airmover



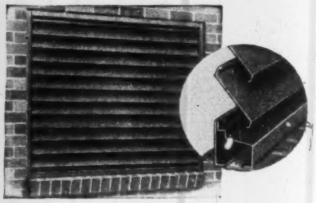
Gravity Valvent



Rotary



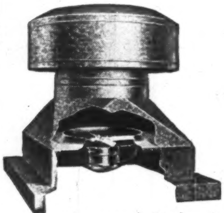
Dexter Heat Valve



Louvers

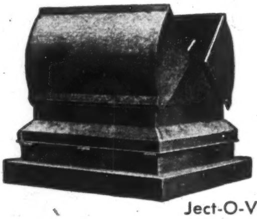
Swartwout Airlouvers are weathertight. Overlapping blades, fixed or adjustable. Unusual size range enables you to fill any opening with equal-size louver units.

Powered Ventilators

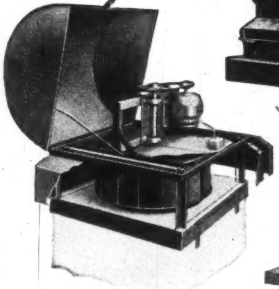


Powered Valvent

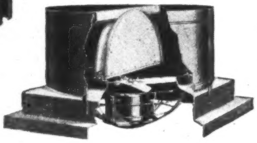
Airjector



Ject-O-Valve



Airlift (duct exhaust)



Whirlout

The Swartwout Company

18568 Euclid Avenue • Cleveland 12, Ohio

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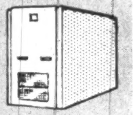
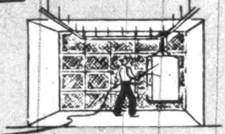
Air Filter for:

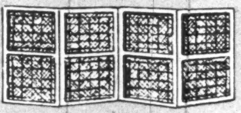


FORCED WARM AIR FURNACES

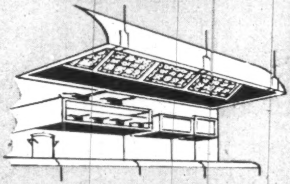
UNIT AIR CONDITIONERS



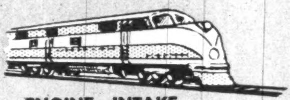
PAINT SPRAY BOOTH



CENTRAL SYSTEM FILTER BANKS



KITCHEN GREASE CANOPIES



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SPECIAL PURPOSE DESIGNS

Tell us your Air Filter needs and specifications

It Adds Up!

. . . THE RP WAY TO ALL YOUR FILTRATION PROBLEMS

For example, the D-O Filter was designed to provide automatic odor removal in addition to the dust removal function of ordinary filters. Their enthusiastic acceptance is proof of demand for this new feature in the field.

This is just another in the long line of products perfected by Research Products Corporation to answer your needs.

We do not believe in exaggerated advertising claims or drum-beating . . . our budget is set up to provide the research and development necessary to produce only those items that you have indicated a demand for.

Check for yourself . . . try us on any difficult installation or unusual filtration problem you may have . . . we will probably have the answer.

We believe that our thinking is correct, and we point to our many problem-answering products to meet specific needs as proof that the RP way . . . adds up!

Write **RESEARCH PRODUCTS CORP., Madison, Wis., U. S. A.**

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WASHABLE AND REPLACEMENT AIR FILTERS • GREASE FILTERS
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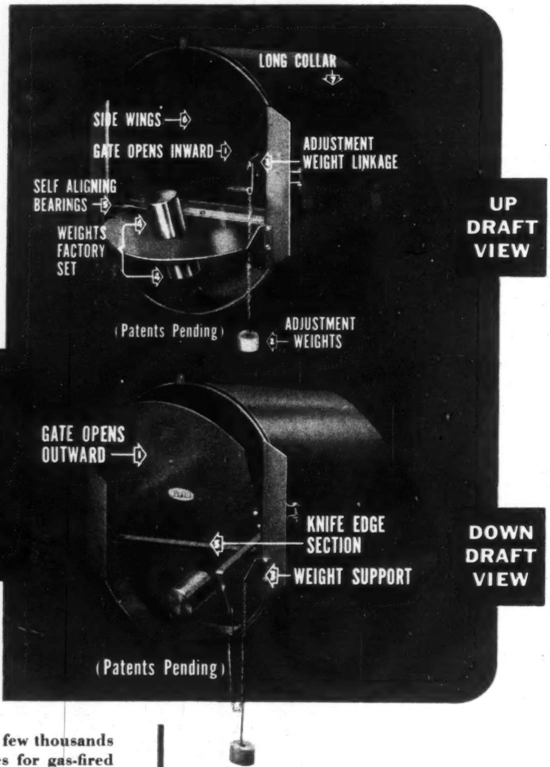
field BAROMETRIC
DRAFT CONTROL FOR
COMMERCIAL & INDUSTRIAL

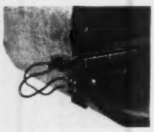
GAS FIRED HEATING PLANTS


LONG COLLAR
SIDE WINGS
GATE OPENS INWARD
ADJUSTMENT WEIGHT LINKAGE
SELF ALIGNING BEARINGS
WEIGHTS FACTORY SET
UP DRAFT VIEW
(Patents Pending)
ADJUSTMENT WEIGHTS
GATE OPENS OUTWARD
KNIFE EDGE SECTION
WEIGHT SUPPORT
DOWN DRAFT VIEW
(Patents Pending)

(Not yet available in domestic sizes)

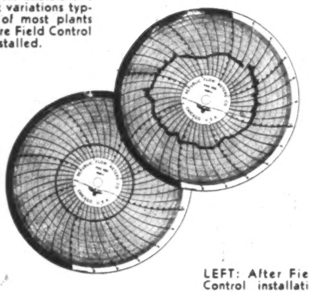
The Field "M-G" Double Acting Draft Control brings greater efficiency, greater economy to gas fired heating plants through extremely accurate control of drafts. The double-acting gate opens inward to regulate up-drafts, and outward to relieve internal or down-draft pressures as small as a few thousands of an inch. This newest Field Draft Control provides for gas-fired heating plants the same accuracy, sensitivity and dependability that have made Field Draft Controls first in the coal and oil-fired fields. Write today for detailed specifications.

FIELD CONTROL DIVISION
of H. D. Conkey & Company, MENDOTA, ILLINOIS



In case of prolonged down draft or blocked flue, an optional auxiliary switch can be mounted on the control and wired to shut off the burner, thus providing protection against the escape of carbon monoxide into the building.

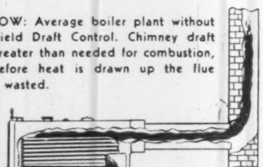
RIGHT: Chart shows draft variations typical of most plants before Field Control is installed.



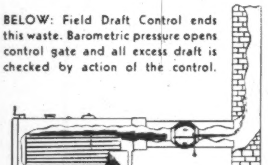
LEFT: After Field Control installation the breeching draft is held constant.

Why a Field Draft Control:

BELOW: Average boiler plant without a Field Draft Control. Chimney draft is greater than needed for combustion, therefore heat is drawn up the flue and wasted.



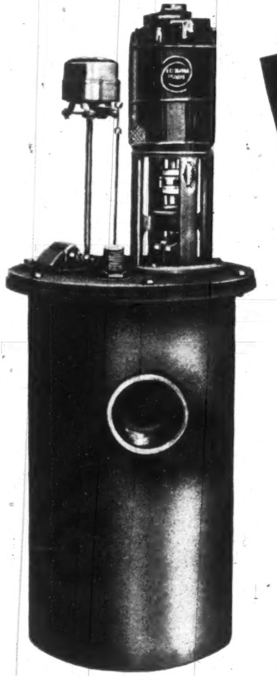
BELOW: Field Draft Control ends this waste. Barometric pressure opens control gate and all excess draft is checked by action of the control.



CONTROLLED DRAFT BY
field
BAROMETRIC CONTROLS

SKIDMORE PUMPS

Choose with Confidence

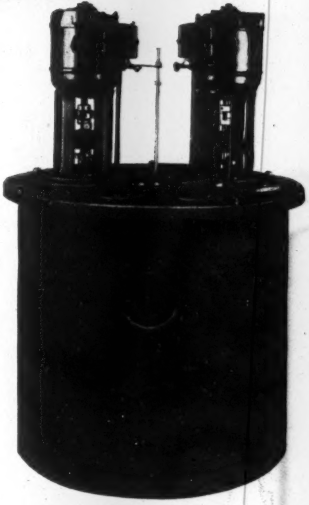


SINGLE UNIT

Type No. UV

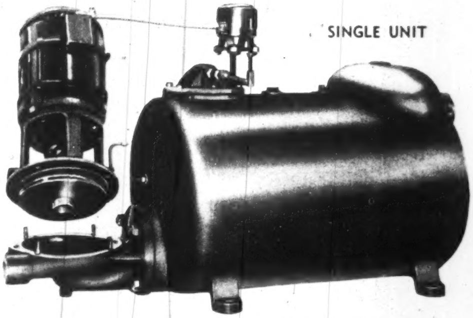
CONDENSATION PUMP AND RECEIVER

Use wherever the condition necessitates underground installations or low returns — sturdily constructed in either single or duplex units. Vertical pump and motor assembly has float and float switch mounted on cover plate and is bolted to sump type receiver. Capacities ranging from 2,000 to 40,000 sq. ft. E.D.R. and discharge pressures from 10 to 75 pounds.



DUPLEX UNIT

Type No. VC



SINGLE UNIT

THE SKIDMORE TYPE VC CONDENSATE PUMP

Designed for rugged and dependable service. Simplicity of construction makes it easily accessible. Used for returning condensate to the boiler or other points, from all types of steam heating or process equipment. Furnished in single and duplex units. Capacities ranging from 1,000 to 65,000 sq. ft. E.D.R. and discharge pressures from 10 to 75 pounds.

QUIET OPERATION

●

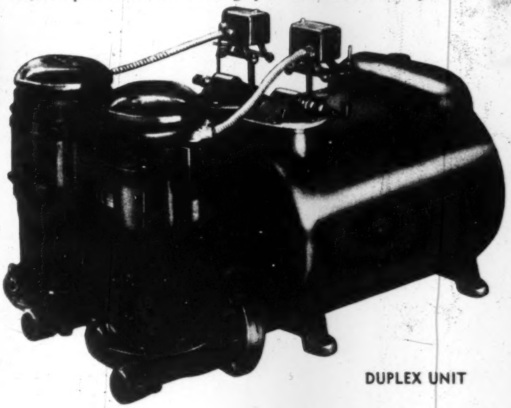
LOW INLET CONNECTION

●

STURDY CAST IRON

●

ACCESSIBILITY WITHOUT DISTURBING PIPING



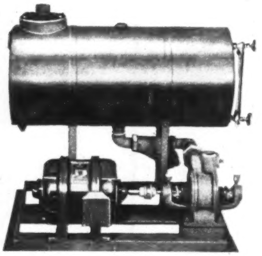
DUPLEX UNIT

MAINTAINED
SKIDMORE
PUMPS
EFFICIENCY

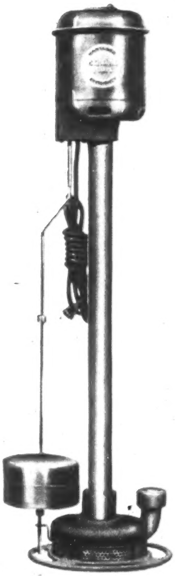
SKIDMORE CORPORATION, ST. JOSEPH, MICHIGAN

MANUFACTURERS OF QUALITY HEATING PUMPS FOR OVER A QUARTER OF A CENTURY

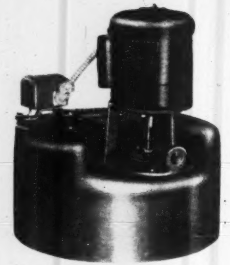
SKIDMORE PUMPS
For Every Requirement



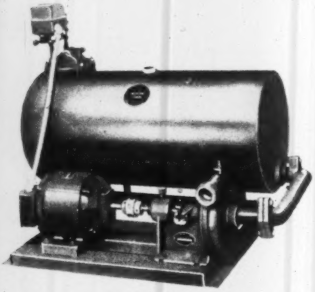
TYPE TM PUMP — The Skidmore High Pressure Turbine Type Pump is designed with motor and steel receiver, completely assembled and mounted on either steel or cast iron base as desired. Pressures up to 150 pounds and boilers to 250 H.P.



SKIDMORE SUMP PUMP — Dependable, light in weight but practical in design. The Skidmore Sump Pump is suited to a wide range of uses, and unusual working conditions, giving smooth, quiet operation. All bronze construction with copper float and stainless steel shaft. Capacity water removal of 3,000 gallons per hour.

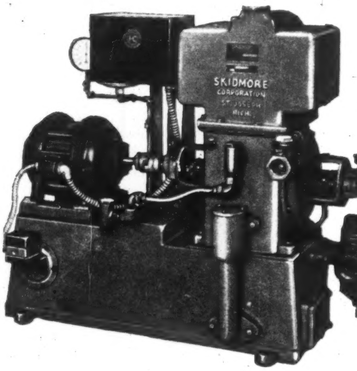


TYPE CV VERTICAL PUMP — A sturdy package type condensate unit. Pump housing and motor are integral casting bolted to top of receiver—it can be installed in limited space—on floor level or in pit. Capacities range from 500 to 10,000 sq. ft. E.D.R. and discharge pressures from 10 to 20 pounds.



TYPE HS PUMP — Highly efficient pump economically designed, mounted on steel base, also furnished with cast iron base and cast iron receiver. Pump is bronze fitted throughout. Capacities ranging from 1,000 to 65,000 sq. ft. E.D.R. and discharge pressures from 10 to 75 pounds.

MAINTAINED
SKIDMORE
PUMPS
EFFICIENCY



SINGLE UNIT

Also made in Duplex Unit

SKIDMORE VACUUM PUMP — Automatically adjusts itself to the varying conditions of the system. Liberal clearance between moving parts means Maintained Efficiency. Capacities ranging from 5,000 to 10,000 sq. ft. E.D.R.

SKIDMORE CORPORATION, ST. JOSEPH, MICHIGAN

Send complete engineering bulletins on the following Skidmore Heating Pumps checked below.

UV	VC	CV	TM	HS	SUMP PUMP	VACUUM PUMP

Name.. **Position**..............................

Company...

Street............................. **City**............................. **State**..................

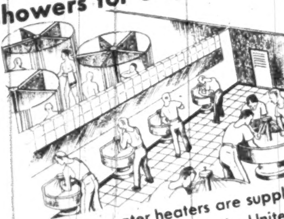
Want complete engineering data?
SEND COUPON

TACO *has a proved record of helping*

FACTORIES · OFFICE BUILDINGS · SCHOOLS · HOSPITALS · CHURCHES · STORES

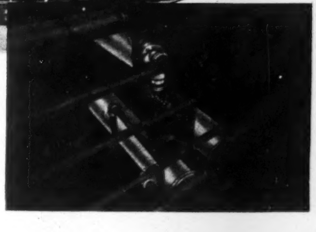
SOLVE THEIR HEAT and HOT WATER PROBLEMS . . .

Provides hot water for wash fountains and showers for employees

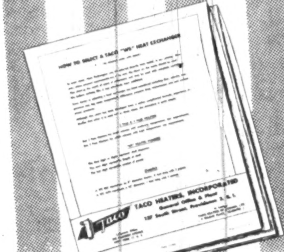


Taco water heaters are supplying abundant low cost hot water in industrial plants throughout the United States. Our more than 30 years' experience in this field is a big help to those with hot water heating problems.

Heats entire building with heat formerly thrown away



A large industrial user of steam was dumping the condensate from their steam processing into a creek. Now, thanks to the 3 Taco heat exchangers on the right, they're reclaiming enough to heat the 220′ x 560 building shown above. Taco products can perhaps do a similar service for you.



ENGINEERS . . . WRITE FOR

simplified selection chart for sizing Taco water heaters under any conditions such as steam pressure, temperature rise and pressure drop.

A TRAINED TACO SALES ENGINEER IS AVAILABLE WHENEVER YOU NEED HIS HELP

Better Heating-Better with Taco

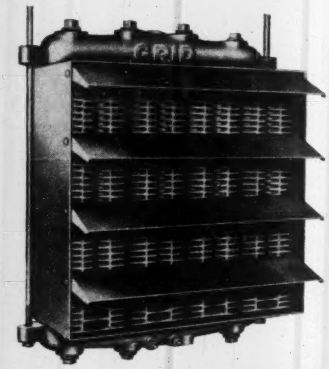
Taco

TACO HEATERS, INCORPORATED

137 SOUTH STREET · PROVIDENCE 3, R. I.

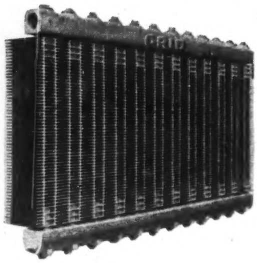
UNIT HEATERS *and* BLAST COILS

T. M. REG.
U. S. PAT. OFF.



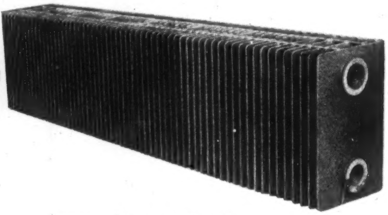
GRID Unit Heaters are designed for low outlet temperatures and greater air delivery to the floor line—not the ceiling—and will safely withstand steam pressure up to 250 P.S.I. without reducing valves. They save fuel cost, too, because they provide heat where it is most needed—to the working zone. Careful selection of fans and motor speeds eliminates stratification of warm air at ceiling level.

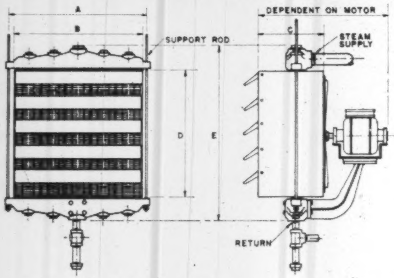
No other type unit heater has their lasting qualities . . . they will have the same high efficiency after years of operation as the day they were installed.



GRID Blast sections have the same high efficiency and lasting qualities as GRID Unit Heaters . . . no tortuous air passages . . . complete absence of ruptures, strains, and warping . . . guaranteed for steam pressures up to 250 lbs.

CAST IRON HEATING SECTIONS
ONE PIECE CONSTRUCTION – No Soldered, Brazed, Welded or Expanded Connections . . . . . .





Overall dimensions for installation of Cast Iron GRID Unit Heater

THE GRID UNIT HAS THESE ADVANTAGES

Low maintenance expense.
More air changes per hour.
Lower outlet temperature.
Larger air volume.

No electrolysis to cause corrosion-leaks or breakdowns.

One-piece construction—no soldered, brazed or expanded connections.

Positive "directed" heat.

Open design that keeps units clean.

CI (CAST IRON) SERIES GRID UNIT HEATER DATA

Model No.	Dimensions A	B	C	D	E	Motor HP	Motor RPM	Vol. Fan CFM	Capacities 5 PSI Steam 60°F Air Btu/Hr.	Final Temp. °F	Pipe Size Supply	Pipe Size Return	Support Rod Dia.	Approx. Ship. Weight Lbs.
CI-1000	11⅝	10½	12¼	10 7/16	17¼	1/25	1550	572	29,080	106	1¼	1¼	½	150
CI-1200	14⅞	13⅛	12¼	13 5/16	21½	1/15	1550	798	45,450	112	1¼	1¼	½	210
CI-1500	17½	15⅜	11½	16	23⅞	⅛	1750	1500	76,500	107	1½	1½	½	280
CI-1520	17½	15⅜	11½	21	28⅜	⅛	1750	1700	101,500	114	1½	1½	½	390
CI-2000	22⅛	20 9/16	11⅞	21 1/16	28⅜	1/6	1150	2600	143,000	110	2	1½	½	490
CI-2025	22⅛	20 9/16	11⅞	25⅞	35¼	1/6	1150	2875	173,640	115	2	1½	½	520
CI-2500	27½	25⅞	13	25⅞	35¼	½	1150	4350	224,000	107	2	1½	⅝	700
CI-2504	27½	25⅞	13	25⅞	35¼	¼	1150	3300	206,000	117	2	1½	⅝	660
CI-2530	27½	25⅞	13	31	40½	½	1150	4650	275,800	114	2	1½	⅝	900
CI-3000	32⅝	31	13	31	40½	½	850	6300	332,000	108	2½	1½	⅝	1020
CI-3000	32⅝	31	13	31	40½	1½	1150	8000	380,000	103	2½	1½	⅝	1070

OFFICES IN PRINCIPAL CITIES

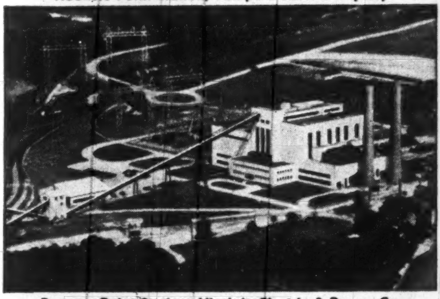
T.M. REG.
U.S. PAT. OFF.

D. J. MURRAY MANUFACTURING CO.

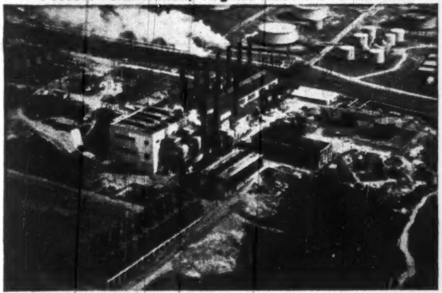
WAUSAU, WISCONSIN

Write for complete catalog information on GRID Unit Heaters, GRID Blast Coils, and GRID Radiation.

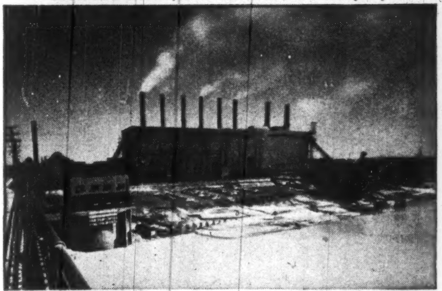
Hookers Point Station, Tampa Electric Company



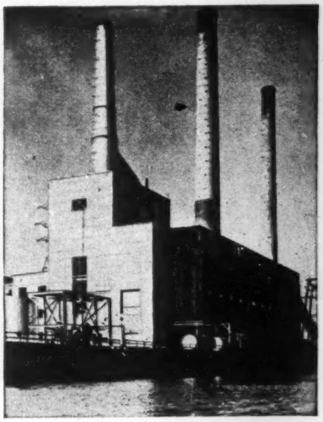
Possum Point Station, Virginia Electric & Power Co.



Louisiana Station, Gulf States Utilities Company



Venice No. 2 Plant, Union Electric Power Company



Riverside Station,
Savannah Electric & Power Company

Designed & Constructed
by
Stone & Webster
Engineering Corporation
and using

Precision Made
OIC VALVES

OIC Valves are *precision engineered* and *precision built*. OIC engineers offer you *precision application* help.

THE OHIO INJECTOR COMPANY
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VALVES

FORGED AND CAST STEEL · IRON · BRONZE

selective heating

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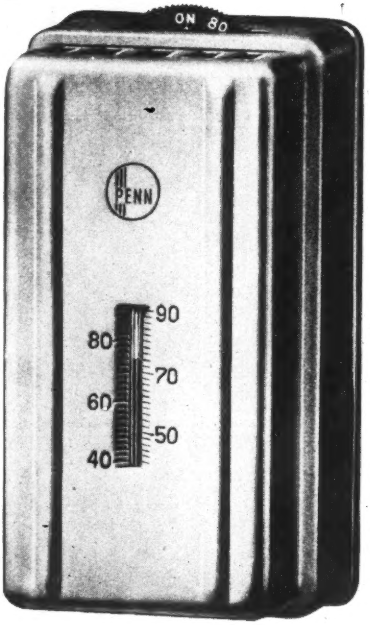
summer ventilation

3 jobs

with 1 UNIT HEATER CONTROL



First, you get selective heating to meet the particular requirements of various sections of a building. Once set, the operation is automatic. Then, heat anticipation holds temperature closely to the selected level for real heating comfort.

Second, during winter months the "ON-OFF" switch is a great fuel saver. A mere rotation of the dial to "OFF" position stops heat flow during idle periods . . . or to little-used areas . . . or to areas where heat can escape such as receiving or shipping rooms which may be exposed to outside temperatures for long periods.

Third, during the summer, this *same* switch permits manual control of unit heater fan for ventilation whenever desired. For continuous fan operation, you merely rotate the dial to "ON" position.

Yes . . . these 3 jobs are possible with *one* PENN Unit Heater Thermostat featuring heat-anticipation PLUS the built-in "ON-OFF" switch! Learn more about this *better control* for unit heaters. Ask your manufacturer, wholesaler or write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 E. 40th Street, New York 16, N. Y., U. S. A. In Canada: Penn Controls Limited, Toronto, Ontario.

PENN

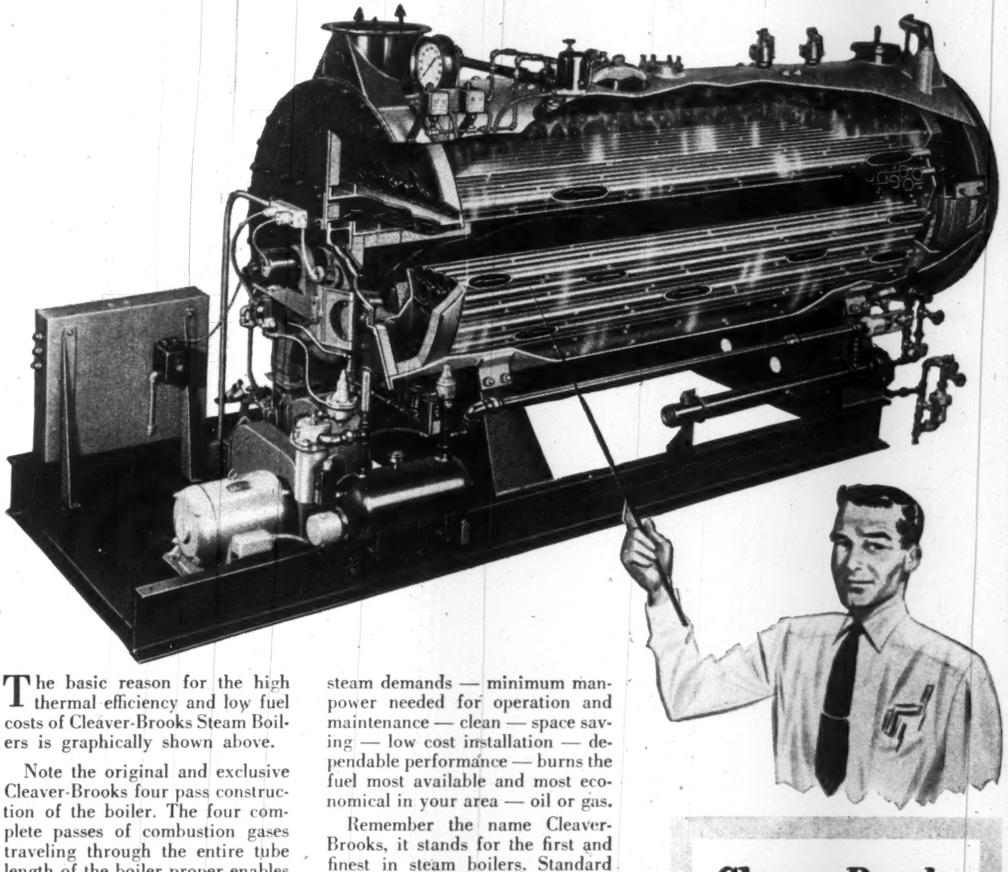
AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES

CLEAVER-BROOKS STEAM BOILER

Four-Pass Construction

MEANS HIGH HEAT TRANSFER — GUARANTEED 80% EFFICIENCY



The basic reason for the high thermal efficiency and low fuel costs of Cleaver-Brooks Steam Boilers is graphically shown above.

Note the original and exclusive Cleaver-Brooks four pass construction of the boiler. The four complete passes of combustion gases traveling through the entire tube length of the boiler proper enables the boiler to absorb the greatest practicable amount of heat from the fuel burned.

All Cleaver-Brooks boilers are of the four pass design and the maximum useable heat is absorbed in these four passes before the combustion gases leave the boiler.

Cleaver-Brooks steam boilers offer many advantages . . . quick, effortless response to fluctuating steam demands — minimum manpower needed for operation and maintenance — clean — space saving — low cost installation — dependable performance — burns the fuel most available and most economical in your area — oil or gas.

Remember the name Cleaver-Brooks, it stands for the first and finest in steam boilers. Standard models available in sizes from 15 to 500 HP, 15 to 250 psi, oil, gas, combination oil and gas firing.

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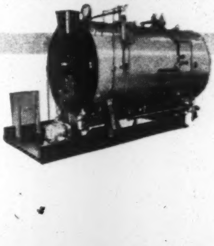
Builders of Equipment for the Generation and Utilization of Heat • Steam Boilers • Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners

Write for your copy of the latest illustrated Cleaver-Brooks Boiler Catalog. It tells and shows why Cleaver-Brooks Boilers will save you money.

Cleaver-Brooks

STEAM BOILERS

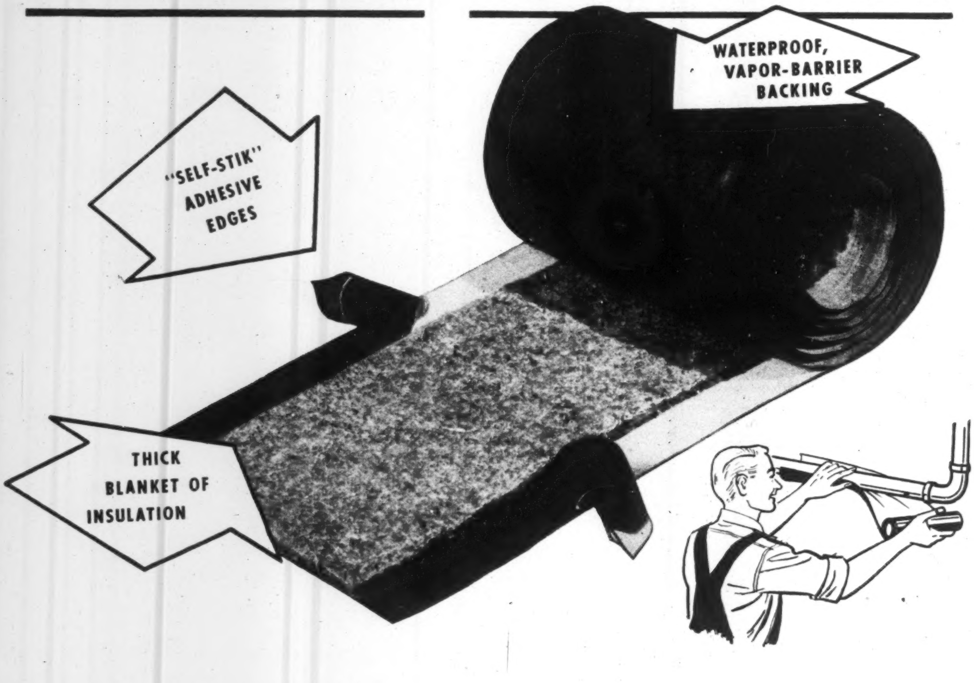
the first and finest of their class



MYSTIK

Self-Stik DRI-PIPE INSULATION

Holds Cold and Heat • Prevents Condensation


WATERPROOF, VAPOR-BARRIER BACKING
"SELF-STIK" ADHESIVE EDGES
THICK BLANKET OF INSULATION

Mystik DRI-PIPE—the insulation with "self-stik" edges—goes on fast, saves time and money on installation. Ideal for low-temperature applications—on cold water lines, cold air ducts, refrigeration lines. Holds temperatures, prevents condensation and dripping, eliminates icing and frosting on refrigeration lines. Also has extensive other cost-cutting insulation uses—on warm water lines, warm air ducts and for sound deadening. Ask your supplier or . . .

WRITE NOW for free sample of Mystik Self-Stik DRI-PIPE Insulation
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MYSTIK CLOTH TAPES • MYSTIK PAPER MASKING TAPES • MYSTIK SPRA-MASK • MYSTIK PROTECTO-MASK • MYSTIK SAND-BLAST

KRITZER—

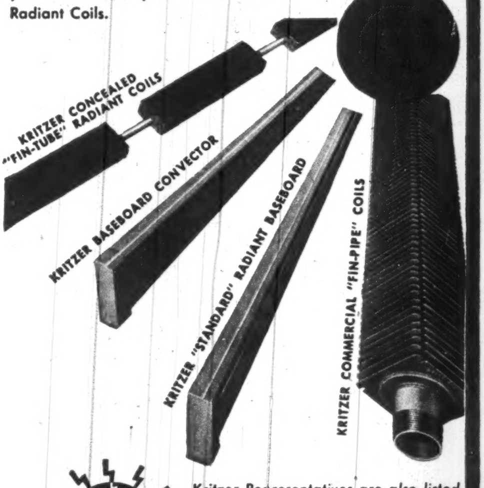
CAN PUT THE HEAT ON ANYWHERE . . .

. . . Thanks to its representatives *and you.* For, wherever you are, there is a Kritzer Radiant Coil expert near you. A man who, from his outstanding experience and ability, and backed by the exclusive Kritzer Certified Ratings, can recommend exactly the right Kritzer Coils to meet your every job need. Remember, in residential, commercial or institutional heating Kritzer men and materials will enable you to do the finest work with the greatest speed and economy.

Solve any heating problem this easy way

FIRST: See your local Kritzer Representative for expert advice and proven recommendations.

SECOND: Then order the required parts from your Jobber's complete stock of Kritzer Radiant Coils.


KRITZER CONCEALED "FIN-TUBE" RADIANT COILS
KRITZER BASEBOARD CONVECTOR
KRITZER "STANDARD" RADIANT BASEBOARD
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Kritzer Representatives are also listed local classified directories. Or clip this page for reference.

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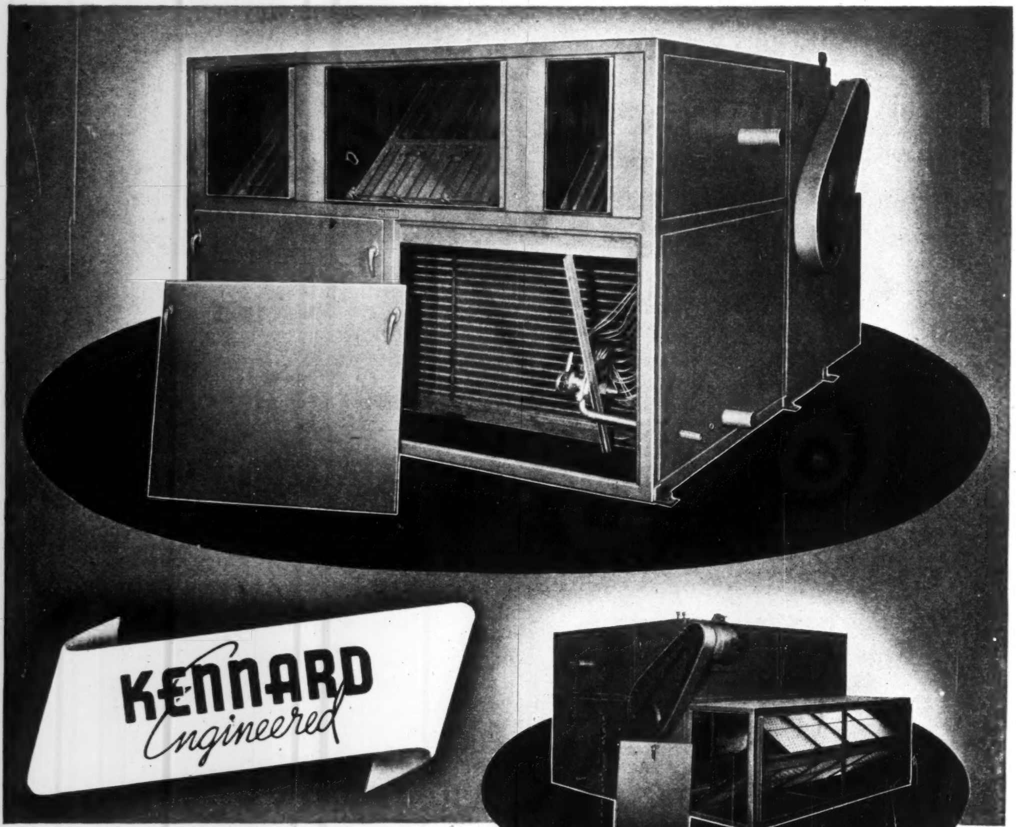

Multi-Zone Units

COOLING-HEATING-ZONE CONTROL

Each zone of the Multi-Zone Air Conditioning Unit can supply independently of the other zones heating or cooling as required by load conditions. This is accomplished by individual control of separately built in dampers for each zone.

Sizes up to 19,800 CFM—coils for direct expansion, chilled water, steam or hot water. Filters, humidifier and mixing box optionally available.

Features of Construction—Penta-Post frame members provide maximum strength and stiffness with a minimum of weight—Sectionalized construction facilitates erection, field handling and shipment—Fire resistant insulation, moisture sealed—Multiple service and access panels.

Representatives in Principal Cities

Write for name of nearest representative and complete information on Air Conditioning Blower Units—Finned Coils — Evaporative Condensers — Cooling Towers—Sprayed Coil Dehumidifiers—Heating and Ventilating Units.

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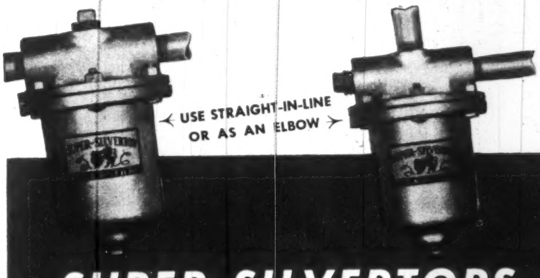
has your steam trap system got by the seat of the pants?

Has your steam trap system got you by the seat of the pants? Does it make you disconnect the piping whenever you replace a seat or service a trap—Does it make you take 50 minutes longer than it should to replace a trap when it wears out . . . Does it cause you to replace traps frequently. Then change over to Super-Silvertops. You can service any size Super-Silvertop without disturbing a single fitting. You save up to 60 minutes every time a new trap is installed as Super-Silvertops fit snugly like an elbow or a coupling. You get longer trap life as the patented guided bucket results in better performance . . . and the special Anderloy seat and valve means longer life. Start today to run your steam trap system instead of letting it run you. Begin a replacement program to change your entire system to Super-Silvertops. Write for the book "Solving Steam Trap Problems" which tells all about the wonderful savings you will receive.



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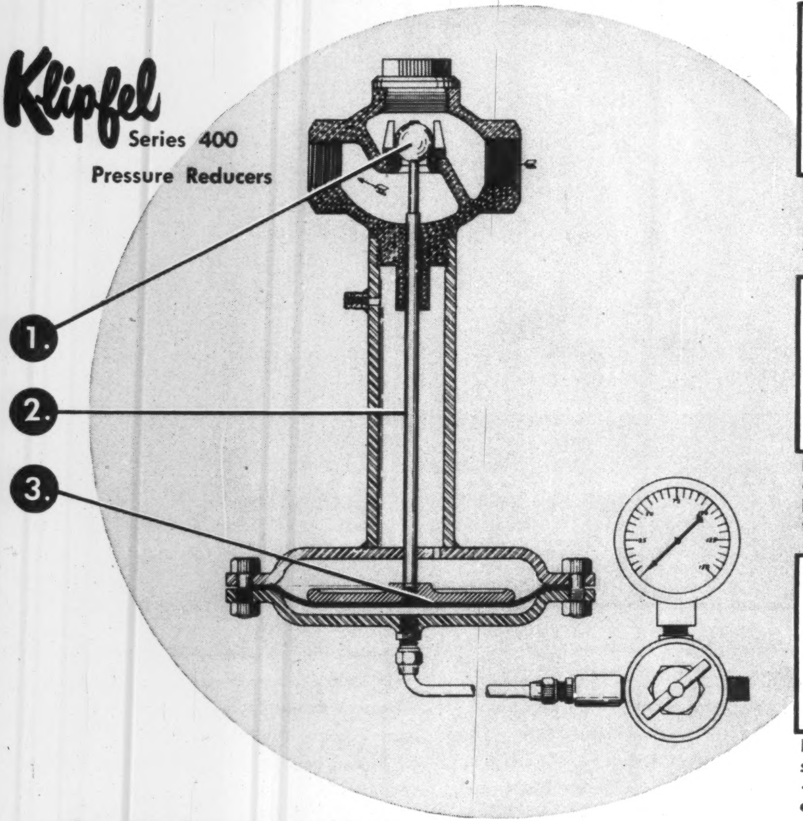
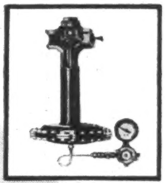
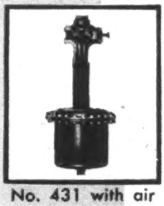
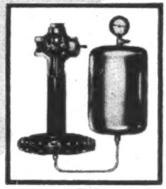



No. 432 with constant air supply—for quick, easy adjustment.


No. 431 with air dome—for isolated installations.


No. 430 with separate air tank—for variable ambient temperature.

Accurate low-cost regulators . . .

FOR longer service with negligible maintenance, operating parts are reduced to just three, inner valve, stem and diaphragm, in the Klipfel 400 Series air-loaded Pressure Reducing Valves. In addition, these 400 Series Valves provide exceptionally close regulation for an unusually low initial cost.

The stainless steel ball inner valve is a perfect sphere, extremely hard and well guided to close to a tight seat. Easily reseated if necessary . . . is self-cleansing and non-sticking. Diaphragm is always in balance . . . no stress, no bursting. Regulation is accurate and easily controlled. For increased safety, flow automatically shuts off in case of diaphragm failure.

For full data on the Klipfel 400 Series Valves, for steam, air, water or gas, write Dept. F-1 for Bulletin No. 148.

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AMERICAN-Standard

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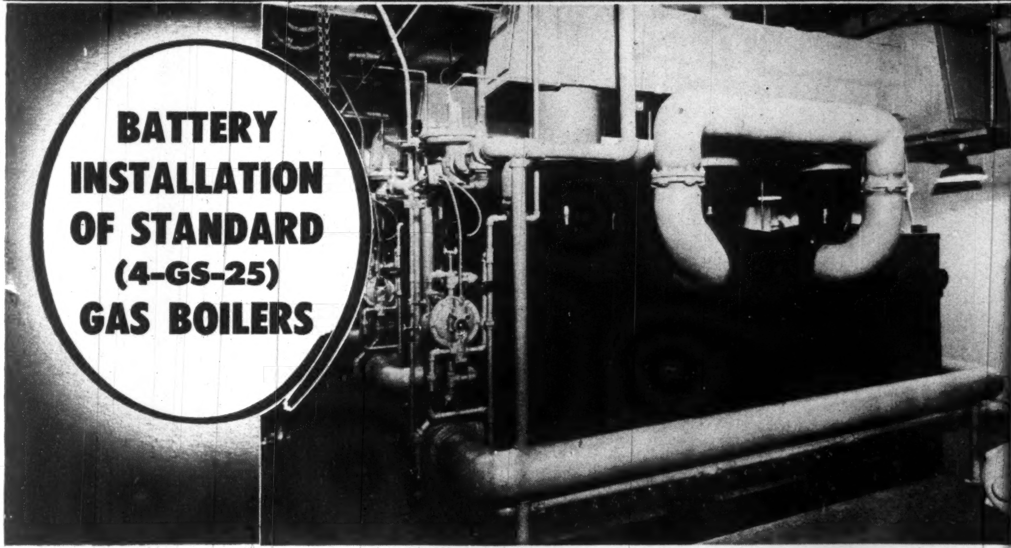


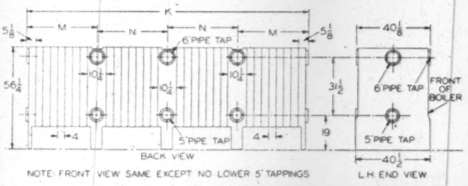
BATTERY INSTALLATION OF STANDARD (4-GS-25) GAS BOILERS

STANDARD GAS BOILERS continue to be the choice of architects, engineers and management for important installations. The battery of three 4-GS-25's shown above is in one of California's newest and busiest office buildings. The comfort and health of its occupants demand a heating system that will provide a dependable supply of warmth throughout every foot of this big building . . . and do it with a minimum operating and maintenance cost.

Standard Gas Boilers come in a wide range of sizes to provide effortless heating in larger homes, apartments, office buildings, hospitals and various commercial and industrial buildings. They can be used in battery installations in larger buildings to provide an extremely flexible heat source through the operation of one or more units, thus giving greatly increased economy during mild weather, as well as perfect comfort in the coldest weather.

Standard Boilers and other top quality heating equipment by American-Standard are sold through selected wholesale distributors to heating and plumbing contractors. **American Radiator & Standard Sanitary Corporation,** P. O. Box 1226, Pittsburgh 30, Pa.

An important feature of larger Standard Boilers is the number of flow tappings provided. For example, type 4-GS-25 has six 6", and type 4-GS-33 (section assembly of which is diagrammed below) has eight 6" flow tappings.



NOTE: FRONT VIEW SAME EXCEPT NO LOWER 5" TAPPINGS

The Standard gas fired cast iron sectional boiler is precision-machined to facilitate quick and easy assembly. Individual sections and parts will pass through boiler room doors without difficulty. For time and labor saving installation, controls, valves and control piping are factory-assembled as far as possible.

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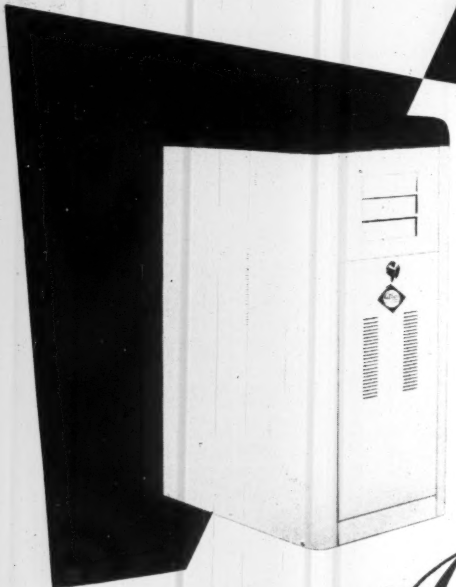
Atlas

BOILER JACKETS AND FURNACE CABINETS

Attractive and sturdy Atlas Cabinets will assist you in selling your furnaces and boilers. Finished cabinets are a necessity in modern day living, where the basement room shares equal popularity with the front parlor. Atlas cabinets have streamlined, rounded edges; modern hardware and are beautifully colored in hammerloid, wrinkle or plain baked finishes in colors of your choice. They enhance the compact modern design of the popular basement amusement room.

Standard Lowboy Horizontal.



Standard Hi-boy Vertical.

Atlas cabinets set up quickly. There are no bolts or screws in an Atlas "tailormade" cabinet. It fits together smoothly and simply. It saves on installation time resulting in lower costs.

Atlas Cabinets are built to your specifications and the demands of your particular boiler and furnace models. They will carry your name and trademark and not that of Atlas. We can produce a full range of all models.

We are prepared to produce cabinets for incinerator, air conditioning and electronic equipment.

Send Your Specifications For Free Cost Estimates to

Atlas MANUFACTURING CO.

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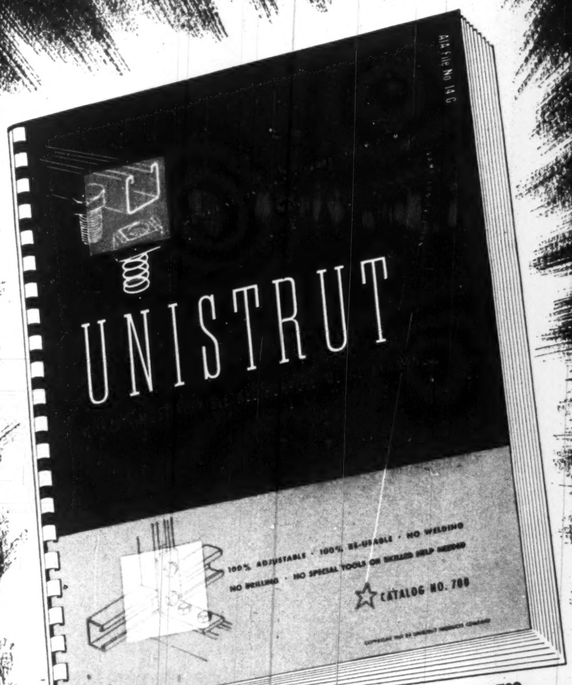
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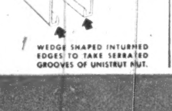
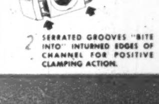
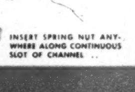


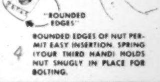
1 WEDGE SHAPED INTURNED EDGES TO TAKE SERRATED GROOVES OF UNISTRUT NUT.



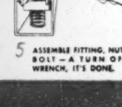
2 SERRATED GROOVES "BITE INTO" INTURNED EDGES OF CHANNEL FOR POSITIVE CLAMPING ACTION.



3 INSERT SPRING NUT ANYWHERE ALONG CONTINUOUS SLOT OF CHANNEL . .



4 ROUNDED EDGES OF NUT PERMIT EASY INSERTION. SPRING (YOUR THIRD HAND) HOLDS NUT SNUGLY IN PLACE FOR BOLTING.



5 ASSEMBLE FITTING, NUT AND BOLT—A TURN OF THE WRENCH, IT'S DONE.

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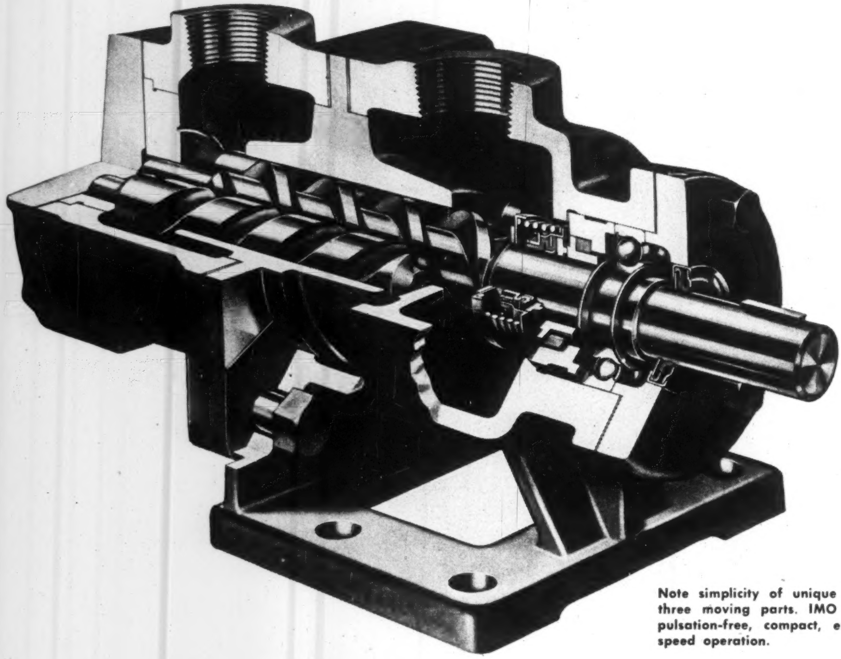
NOW...a new **LOW-COST** IMO

for HIGHER pressures



Note simplicity of unique IMO design—only three moving parts. IMO is reliable, quiet, pulsation-free, compact, excellent for high-speed operation.

You've either heard about or used the proven De Laval—IMO A313A pump. Now De Laval brings you the A313B IMO for a wide variety of oil handling applications for higher pressures. This quality-designed, quantity-produced pump saves you up to 40% in initial cost over other IMO models for pressures up to 275 psi.

This new rotary positive displacement pump gives you all the advantages of the famous IMO pumping principle. Use it for capacities to 80 gpm, pressures to 275 psi and intermittent pressures to 325 psi... It handles light or viscous fluids in hydraulic systems, rotary and steam atomizing oil burners, lubrication, governing systems and similar services.

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IMO PUMP!
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WARMER
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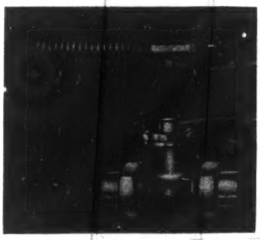
DIAL COMFORT

...with Sylphon Control



Sylphon Control 928-C. Convenient manner of adjustment. Connecting tube length as required. Suitable for steam pressures up to 15 lbs.; other types available for pressures up to 75 lbs.

● Put Sylphon Temperature Regulators to work in office buildings, plants, aboard ships—and they maintain temperature *exactly* as wanted. They do it thriftily, too—rooms are never too hot, never too cold.

No. 928-C, pictured here, is just one of the family of Sylphon "comfort regulators." It's ideal for modulating control of air temperature in ducts. Simple and compact, it is highly sensitive to slightest temperature changes.

Its packless valve eliminates service problems. No exposed operating mechanism. Especially suited for installation in ordinarily inaccessible locations. Self-powered . . . sturdily built to operate faithfully for years.

Find out how No. 928-C, or other Sylphon Regulators, can help assure controlled comfort at *all* times. For complete details, write for Catalog AH-50.

FS

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Temperature Controls • Bellows Devices • Bellows Assemblies

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SINCE 1898
STOKERS

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PRODUCTS AND SERVICE

Detroit Stokers are unsurpassed for economy and dependability. Both Underfeed and Overfeed Stokers of many sizes and capacities. All grades of bituminous coal are successfully burned without expensive preparation. Operating costs are low, plant efficiencies raised to new standards and capacities of present boilers increased. The purchaser is assured a Detroit Stoker best suited to his particular boiler, kind of coal available and capacity required. Proper design and application by experienced builders produce best results. Write for *Bulletin*

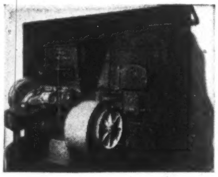
DETROIT LOSTOKER

Now Available with Detroit Adjustable Feed (Coal Feed Control).

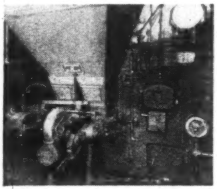
Detroit LoStoker, built to fit the furnace of Firebox Boilers. Requires no side wall or front wall brick work.

Detroit LoStoker is a complete firing unit. Compact — single retort — mechanically driven — plunger feed — side-cleaning design. Many sizes and capacities for various types of boilers. Simple, accessible, dependable.

Now the LoStoker is available with the *Detroit Adjustable Feed*, a reliable automatic coal feed control. It regulates the fuel supply according to the load when connected to a Master Regulator which also controls the air. Coal and air are thus proportionately varied for maximum efficiency at all capacities. Write for *Bulletin*



Detroit UniStoker with Adjustable Feed provides a wide range of coal feed control.



Installation of Detroit Double Retort Stoker now equipped with Detroit Adjustable Coal Feed Control.

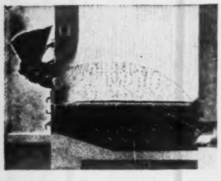
DETROIT UNISTOKER

Plunger feed, side-cleaning stoker is available in various sizes for 125 to 250 horsepower boilers. Compact, unit type, has full-housed blower, either motor or steam turbine driven, conveniently mounted at stoker front. Adjustable Feed, provides for either manual or automatic coal feed control. Thousands in daily operation. Write for *Bulletin*

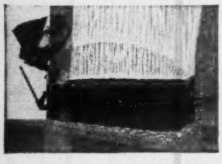
DETROIT DOUBLE RETORT STOKER

Two retorts will do more than one. The Double Retort is a multiple retort stoker having two retorts, with the side-cleaning feature requiring no basement. Now available with Detroit Adjustable Feed Coal Feed Control so that the coal and air supply are always proportioned to the load. For medium sized boilers. Write for *Bulletin*

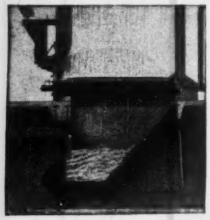
DETROIT ROTOSTOKER



Detroit RotoStoker with Stationary Grates. Ash removal is through doors at grate level.

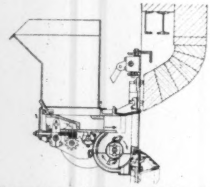


Detroit RotoStoker with Hand Dumping Grates, cleaned by releasing dumping levers at the front.



Detroit RotoStoker with Power Operated Dumping Grates, either steam or compressed air operated.

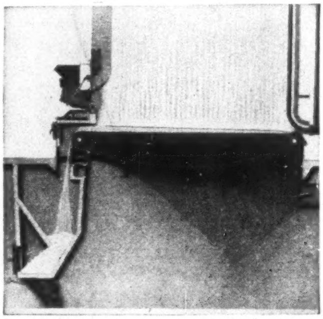
Detroit RotoStoker is spreader stoker with OVERTHROW ROTORS that distribute the fuel uniformly in the furnace. Fine particles burned in suspension. Coarse coal, burned on the grate with a comparatively thin but uniform fuel bed. Three types of grates shown are available. RotoStokers burn successfully an extremely wide range of fuels without any special preparation. Responsive to fluctuating loads, maintaining uniform steam pressure under automatic control of fuel and air supply to the furnace. Operate with high CO_2, low combustible loss in ash. Little power required for operation. Maintenance costs are negligible. In combination with coal, RotoStokers also successfully burn wood and other refuse. Write for *Bulletin*



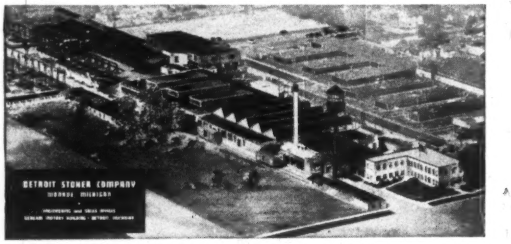
Rotor Assembly — shows the coal feed-plate, the adjustable spilling plate, and the air-cooled Rotor housing. The Rotor shaft operates in water-cooled ball bearings.

DETROIT ROTOGRATE STOKER

An advanced design of spreader stoker with FORWARD MOVING GRATES for large and medium boilers. Fine particles of fuel are burned in suspension and coarse coal, burned on the grate. Screenings or crushed run-of-mine coal are used without grinding or pulverizing. Successfully burns a wide range of fuels, such as the lower grades of Bituminous Coal and Lignites, mined in the Western States, as well as the better grades of Bituminous Coal. Fuels of high ash content are burned with higher burning rates for longer periods. Intermittent cleaning of fires or disturbance of uniform combustion is eliminated by the slow, continuous FORWARD MOVEMENT OF THE GRATES that discharges the ash at the front. Combustible content of ash is usually less than two per cent. Write for *Bulletin*



Detroit RotoGrate Stoker has a CONTINUOUSLY CLEANING FORWARD MOVING GRATE that permits higher burning rates with fuels of either high or low ash content.



Manufacturing facilities are unexcelled. All Detroit Stokers are completely assembled and inspected at our works and erected under expert supervision.

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AUTOMATIC CONTROLS

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THE MERCURY SWITCH IS A FEATURE IN MERCOID CONTROLS. THE REASON FOR THE MERCURY SWITCH IS THE ADDED SAFETY-BETTER PERFORMANCE AND LONGER CONTROL LIFE-ALL OF WHICH ARE IMPORTANT WHEREVER CONTROLS ARE REQUIRED

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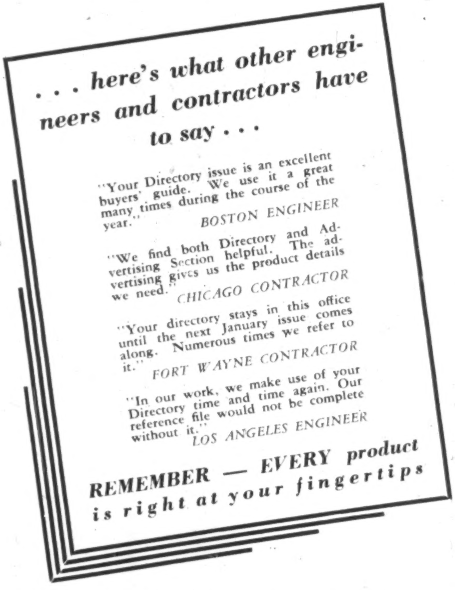
Keep it handy . . . the time you save with it can be used to advantage in other ways.



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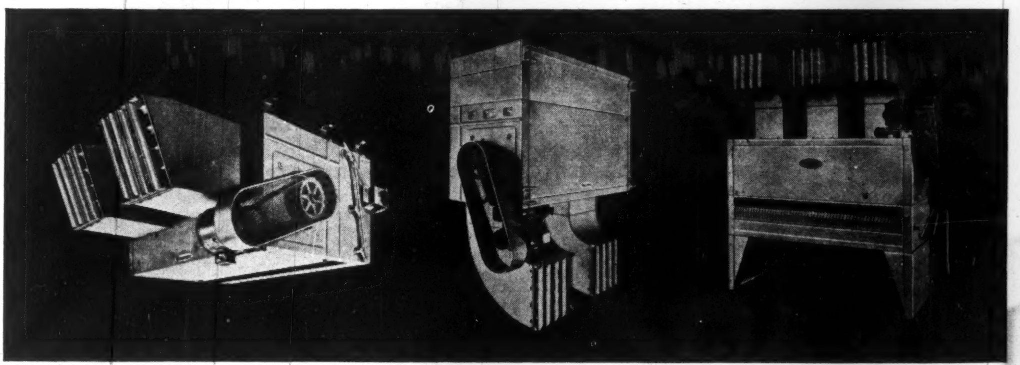
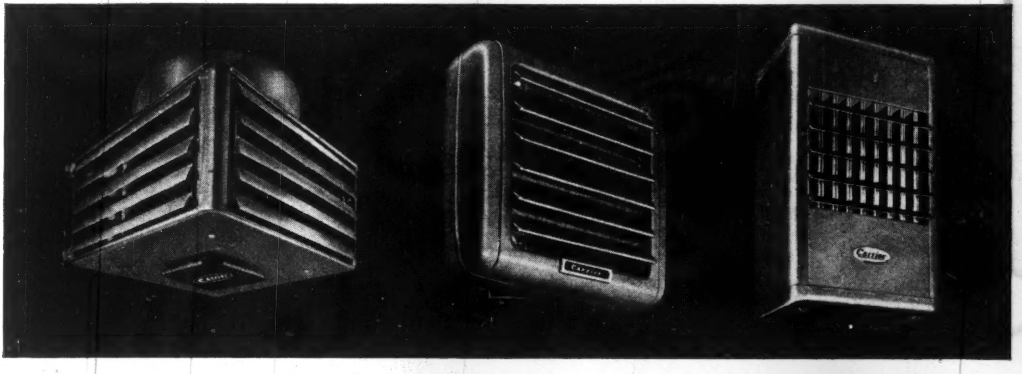
Low-cost heat for any size space

Carrier units heat big buildings or small, efficiently, economically



CARRIER BLOWER-TYPE HEAT DIFFUSERS 46P,Q,R heat *and* ventilate large enclosed areas in factories, warehouses, hangars, garages, etc. Floor, wall or ceiling mounted. Sectionalized for easy handling. Quickly altered to fit changing needs. Multiple discharge outlets with adjustable louvers deliver air in practically any direction. For use with steam or hot water. Available in 7 sizes, to 1,720,000 Btu's, they offer air-handling capacities from 4000 to 25,000 cfm. *Write Carrier Corporation, Syracuse 1, N. Y., for the catalog, "Carrier Heat Diffusers."*



CARRIER PROPELLER-FAN TYPE UNIT HEATERS. *Four-way Directed-flo vertical model 46S* gives quick heat from higher ceilings. Discharges in four directions, at any angle, in any quantity. Steam or hot water. 7 sizes: 82,000 to 500,000 Btu's. *Horizontal model 46U* directs warmed air from heights of 15 to 18 feet. Attractive, quiet, rugged. Single-row Aerofin heating coil with widely spaced fins offers less air resistance, makes cleaning easier. Steam or hot water. 10 sizes: 21,000 to 200,000 Btu's. *Gas-fired models 46T, shown, and 46TD (duct type)* give clean, economical heat wherever gas is available. Both feature one-piece heat exchanger and combustion chamber of Aluminized Steel. AGA-approved for all types of gas. 7 sizes: 70,000 to 230,000 Btu's.

Carrier

The Unit Heater Industry is proud of the recognition accorded it by the armed services and procurement departments of the United States Government. Proven in grueling use during World War II, unit heaters are now standard equipment in ships, plane hangars, living quarters, garrison buildings—wherever reliable, efficient heat is necessary for the completion of a task or the well-being of our fighting forces. On the home front, unit heaters serve equally important roles in industrial plants producing war material supplying the needs of the allied forces.

AIR CONDITIONING · REFRIGERATION · INDUSTRIAL HEATING

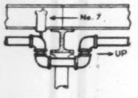
If they're Maid-O'-Mist *Auto-Vents they're made right for the job*

Since no single air valve can meet all venting requirements of hot water heating systems, Maid-O'-Mist offers you a complete line of auto vents, each suited to special needs. Whichever Maid-O'-Mist Auto-Vent you use, you can be certain it is designed to do its venting job efficiently and dependably.

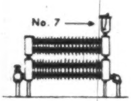
2106 2-227
7 AUTO-VE
PATS. PEND.
D-O' MIST
CHICAGO, ILL.

No. 7 Auto-Vent

Self closing, float operated valve gives positive action for continuous venting. Large venting capacity, for pressures up to 75 lbs.



Venting trapped mains and circulating lines



Venting hot water convector radiator

Venting high points on mains

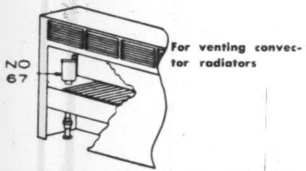
No. 27 For horizontal mounting No. 27 Auto-Vent offers same features and capacity as No. 7 Auto-Vent. For pressures up to 50 lbs.

No air chamber required. Size 4-3/8" x 2-1/4". Send for Catalog Sheet No. 7.

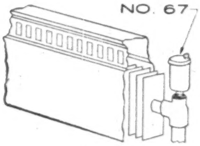
2106 2-227
AUTO-V
PATS. PEND
O'-MIST
CHICAGO, ILL

No. 67 Auto-Vent

Self closing, float operated valve gives positive action for continuous venting. Designed for limited space, pressures up to 30 lbs.



For venting convector radiators

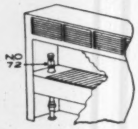


For venting baseboard radiation

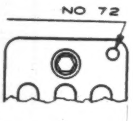
No air chamber required. Size 3-3/16" x 1-1/2". Send for Catalog Sheet No. 67.

No. 72 Auto-Vent

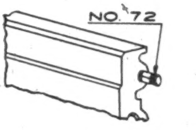
Fast venting *expansion type* valve

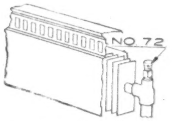


For venting convector radiators



For venting free standing radiators





For venting baseboard radiation

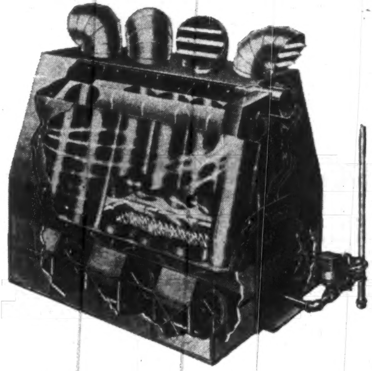
No air chamber required. Size 1-1/4" x 1/2". Send for Catalog Sheet No. 72.

Fast delivery from your jobber.

MAID-O'-MIST Inc.
HEATING SPECIALTIES

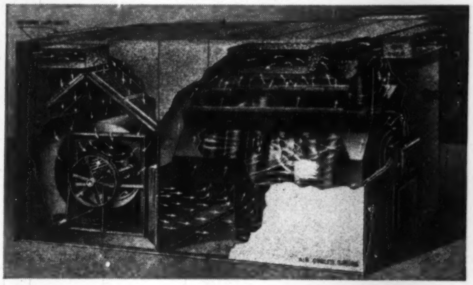
AUTOMATIC HUMIDIFIERS . . . . . AUTO-VENTS
WATER LINE CONTROLS . HEATING SPECIALTIES
MAID-O'-MIST, Inc.
3217 NORTH PULASKI ROAD . CHICAGO 41, ILL.

Specify CAMPBELL HEATERS FOR BIG WARM AIR JOBS



◀ DIRECT-FIRED SPACE HEATERS

Use these Campbell units for big space-heating jobs. Available for oil, gas and stoker firing in capacities up to 2,160,000 BTUs per hour. These extra heavy welded steel heaters are built to deliver long, dependable service and exceptional fuel economy. Available in all sizes shown on chart.



8000 SERIES HEATERS ▶

These outstanding heaters make it easy and practical to use warm air heat in large multi-room buildings. Large, silent blower assures quick distribution of heat. Easily adapted for summer air conditioning. Available for all fuels in sizes shown on chart.

CHECK *this* CHART

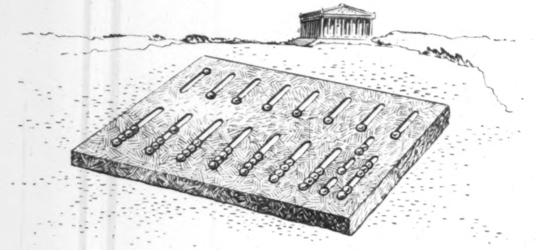
Direct Fired Spacer Heater No.	8000 Series Heater No.	Output Capacity B.T.U. Hr. (1)	Heating Surface Sq. Ft. (2)	Normal Blower C.F.M. for 65° to 140° Temp rise (3)	FIRING RATES (4)		
					OIL GPH	1000 BTU Gas CFH.	Stoker Lbs./Hr.
U8075	8075	725,000	280	8,850	7.0	900	80
U8100	8100	893,000	320	10,900	8.5	1,120	100
U8125	8125	1,080,000	360	13,200	10.5	1,350	125
U8150	8150	1,275,000	440	15,600	12.0	1,600	150
U8175	8175	1,440,000	480	17,500	14.0	1,800	175
U8200	8200	1,725,000	600	21,100	16.5	2,150	200
U8250	8250	2,160,000	750	26,400	20.5	2,700	250

1. Allow 10% to 25% above heat loss figure for pick up load and if heater is not located in room to be heated allow 10% to 15% for radiation and duct losses. The upper figures are preferable for best operating economy and life of the equipment.
2. Heat emission per sq. ft. of heating surface is 3,000 BTU/hr. or less.
3. Air volume and motor size can be varied to fit various conditions and duct systems.
4. An induced draft blower can be furnished if a stack or chimney is not available. The gas passages of the heater are adequate so that an induced draft blower is not ordinarily necessary. Stack connection can be provided through the top of the casing to support a stack through the roof.

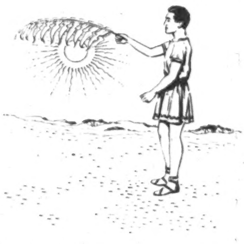
CAMPBELL HEATING COMPANY
P. O. BOX 833 · DES MOINES 4, IOWA

Air-Conditioning the ABACUS

In
Ancient
Greece
(351 B.C.)

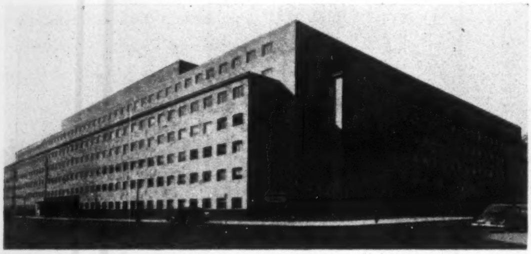


One form of Abacus, or counting-board, ancestor of Accounting.

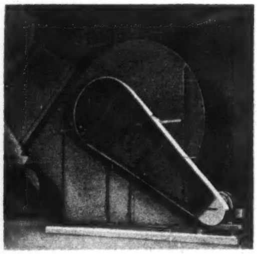


One-hand-power fan, an Acanthus branch.

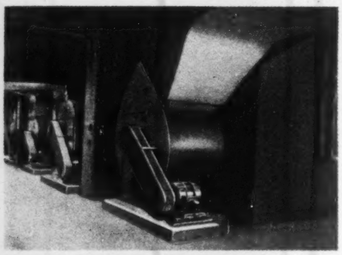
In
Modern
U.S.A.
(1951 A.D.)



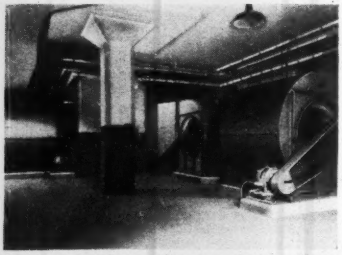
New U.S. General Accounting Office, Washington, D.C. Builders: John McShain Co. Mech. Contrs.: Wm. H. Singleton Co. Fans, Accessories: Stone Htg. & Vtg. Co.



40-H.P. Bayley Aeroplex fan, 98¼" wheel dia. Smaller fan in left background.



A group of 4 Bayley Type AP's in one of the equipment rooms.



View in another equipment space. These Bayley double-width fans save headroom.

"The Greeks had a word for it". Perhaps, — but if the Greek who pushed pebbles on his Abacus could view our latest model "counting-house", words might fail. Accounting has come a long way.

Fans and Air-Conditioning have come a long way, too. That's why the occupants of this great building enjoy year-'round climatic comfort. Second only to The Pentagon in floor area, the new GAO building requires 4000 tons of refrigerating capacity and 1,850,000 CFM of air-handling capacity. The air is supplied, circulated and exhausted by 65 Bayley fans, of which 23 range from 60" to 98¼" wheel diameter, totalling about 700 H.P.

Bayley fans are engineered to modern needs. The "know-how" directed to designing and building the GAO fans is available to you. That "know-how" is your best assurance of satisfaction. Prove it for yourself. Use Bayley fans on your jobs.

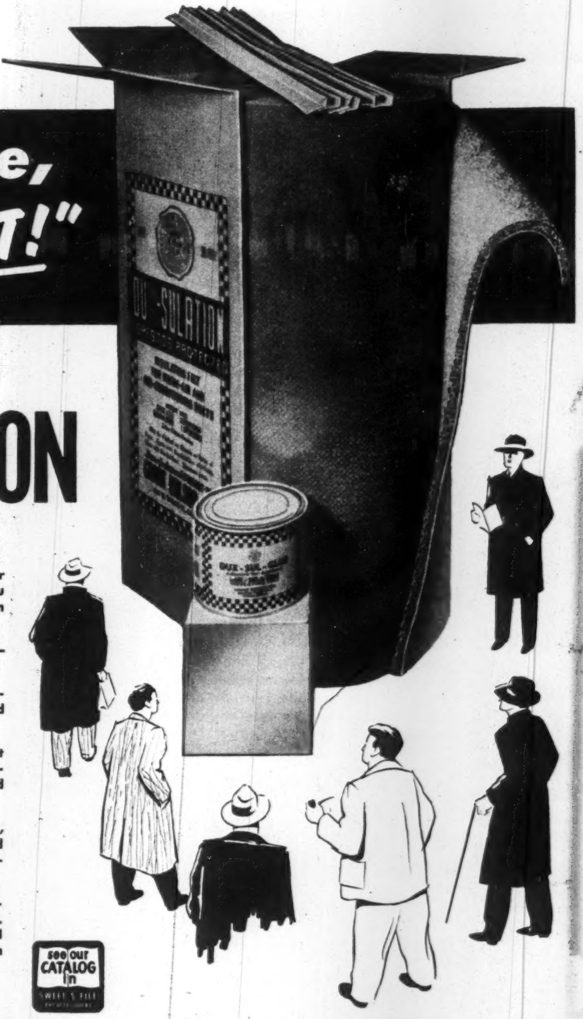
Bayley **AIR HANDLING EQUIPMENT**

Performs better, — longer

BAYLEY BLOWER COMPANY

6600 W. BURNHAM ST. MILWAUKEE 14, WIS., U. S. A.

"...costs more, AND WORTH IT!"



Grant Wilson
DUX-SULATION
(ASBESTOS-PROTECTED)

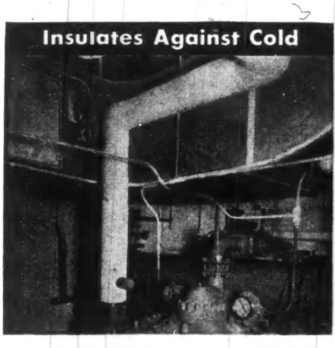
The initial cost of DUX-SULATION may be higher — but by the time a good job is completed you have the BEST Thermal/Acoustical Duct Insulation possible. It's worth more because:

1. Comes complete with adhesive and tape — there are no extras to buy.
2. It permanently maintains its original specified thickness — even at the corners and joints.
3. Its application is fast, simple and secure. It is ideal for application on (inside or outside) round, rectangular or irregular shaped duct-work.
4. DUX-SULATION will not mat down, sift, crumble, powder or shift. It can be installed in the shop or on the job because it's stronger and tougher. It's non-irritating.

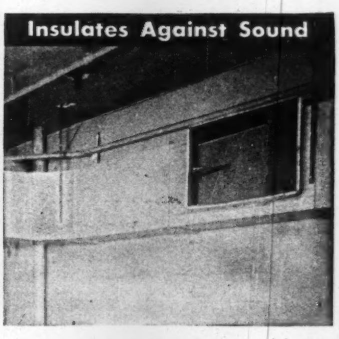
You will want to see and feel the superior construction of Asbestos-Protected DUX-SULATION. So write for a free sample today. Then you will know why it's worth more and why you can specify it with confidence.

Write to: GRANT WILSON INCORPORATED
BOARD OF TRADE — SUITE 1560
CHICAGO 4, ILLINOIS

see our CATALOG in SWEET'S FILE


Insulates Against Cold

Insulates Against Heat


Insulates Against Sound

To keep plant operating costs down to earth

To fulfill its tremendous task of building engines and other aircraft components for defense and civilian needs, United Aircraft Corporation is in an almost continuous state of expansion.

An addition to the power house at the main plant in East Hartford (below) has recently been completed. The $12,000,000 Andrew Willgoos Turbine Laboratory was finished and put in operation on jet research in the past year. Under construction are new plant facilities at the Pratt & Whitney Aircraft Division in North Haven, and the Hamilton Standard Division in Windsor Locks, Conn.

When it comes to plant operation, United Aircraft is right down to earth. To make sure of lasting efficiency and low maintenance in fluid control, they chose Jenkins Valves for all of these new buildings. At the right is a typical valve station in the vast network of piping at the Willgoos Laboratory.

Long a leader in the development and production of piston engines, notably the famed Wasp, the Pratt & Whitney Division is now a major producer of jet engines like the J-48 Turbo Wasp that powers the Navy's new Grumman Panther, shown above.

Design Engineers:
ALBERT KAHN ASSOCIATES, DETROIT, MICH.
General Contractors:
THE WADHAMS & MAY COMPANY, HARTFORD, CONN
Piping Contractors:
THE LUMSDEN & VAN STONE DIVISION
MIDWEST PIPING & SUPPLY CO., INC., BOSTON, MASS.

United Aircraft Corporation

relies on

On their low upkeep cost record, Jenkins Valves are being specified for more and more of the new industrial plants, the modern commercial, institutional, and municipal buildings that are setting new standards in operating efficiency.

Despite their *extra* value, proved in every type of service, *you pay no more* for Jenkins Valves. For new installations, for all replacements, let the Jenkins Diamond be your guide to lasting valve economy. Jenkins Bros., 100 Park Ave., New York 17, Jenkins Bros., Ltd., Montreal.

JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864

TRADE JENKINS MARK

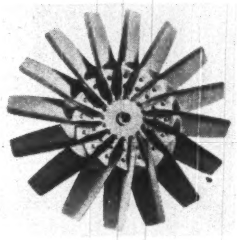
Jenkins Bros

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS EVERYWHERE

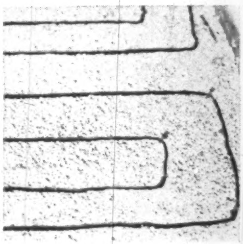
EQUIPMENT DEVELOPMENTS...

Industrial Propeller Fan Wheels

HPAC 1—Propeller fan wheels in three models: for spot ventilation and spot cooling (four blades); for use in power ventilators, cooling towers, etc., (eight blades); and for use in high pressure ventilators, tube axial type fans, etc., (12 to 32 blades) — Baltimore Fan Co., 2615-35 Mathews St., Baltimore 18. The wheels are available in a number of sizes varying from 24 to 96 in. in diameter. The eight blade model is designed for medium pressures up to 1 in. static, maximum, the 12 to 32 blade model (illustrated), for pressures up to 3 in. static. The steel blades are drawn to form a cantilever action, and are riveted to heavy steel center plates.



Fan Wheel



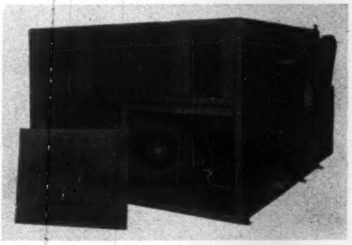
Heating Cable

Electric Heating Cable

HPAC 2—"Thermwire" flexible electric heating cable, a heavy gage nickel-chromium resistor wire with abrasion resistant insulating sheath, for use where a portable heat source is required to prevent ice formation and to cope with other cold weather problems — Edwin L. Wiegand Co., 7610 Thomas Blvd., Pittsburgh 8. It is available in two packaged sets: one being 80 ft long, and using 400 watts, 115 volts; the other, 160 ft long, using 800 watts, 230 volts. Each has a 10 ft cold lead section and plug. Embedded in asphalt or concrete, the cable can be used to melt ice from sidewalks, driveways, etc. Other applications include protection against snow and ice on roofs, gutters, and downspouts, preventing pipe freezing, heating soil, etc.

Multi-Zone Air Conditioning Units

HPAC 3—Multi-zone air conditioning units for providing heating or cooling as required by zones — Kennard Corp., 1819 S. Hanley Rd., St. Louis 17. Each zone operates independently of the other, since there is individual control of separate built-in face and bypass dampers for each zone and the heating coils are arranged in parallel rather than series. Sizes up to 19,800 cfm.



Draft Control for Industrial Gas Fired Boilers

HPAC 4—Type M-G "Double Acting" draft control designed to provide draft regulation and immediate downdraft protection for gas burners of 400,000 Btu per hr input and over — Field Control Div., H. D. Conkey Co., Mendota, Ill. The unit utilizes a gate which swings inward to provide regulation of updrafts, and yet swings freely outward for immediate protection from downdrafts,

For your convenience in obtaining more information about any of this equipment, use this coupon.

FOR YOUR CONVENIENCE [1-52]

Heating, Piping & Air Conditioning
6 N. Michigan Ave., Chicago 2, Ill.

Please ask the manufacturers to send me more information about the equipment mentioned under the following reference numbers in Equipment Developments and Recent Trade Literature

(Circle each HPAC number in whib you are interested)

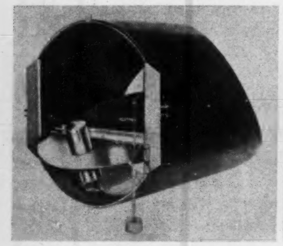
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115
116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
131		133	134	135	136	137	136	139	140	141	142	143	144	145
146	147													

Name ______________________ **Title** ______________

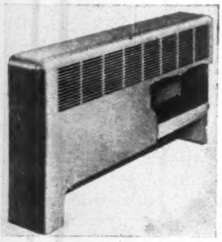
Company ______________________________

Address ______________________________

City ____________________ **Zone** ______ **State** ______________ the manufacturer states. It will be available in sizes to fit flue pipes from 8 to 25 in. in diameter. Available as optional equipment is a safety switch which provides burner shutoff in case of a dangerously prolonged downdraft or blocked flue condition.



Draft Control



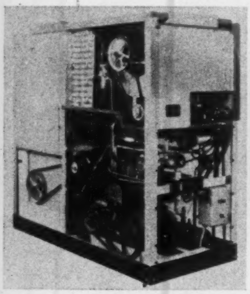
Radiator

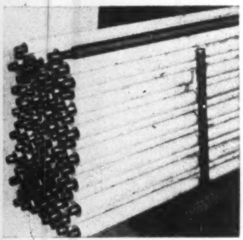
Convector Radiators

HPAC 5—Convector radiators with non-ferrous heating elements (copper tubes and headers and aluminum fins) — Bush Mfg. Co., 179 South St., West Hartford, Conn. Cabinets are of heavy gage steel and have removable front panels. Lengths vary from 16 to 64 in. and depths from 4 to 10 in., with either 20, 24 or 32 in. heights.

Packaged Heat Pumps

HPAC 6—New line of packaged heat pumps, electric air conditioning units which utilize the outside air as a source of heat, and automatically provide heating, cooling, dehumidification and ventilation in all seasons for offices, stores, homes, etc., with or without basements — General Electric Co., Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J. The unit is being offered in 3 and 5 hp sizes. It operates on the same principle as an electric refrigerator, except that the cycle is reversed to provide heat instead of refrigeration when heat is required. Thermostat setting is the only action required by the user. The equipment senses the change in weather conditions.





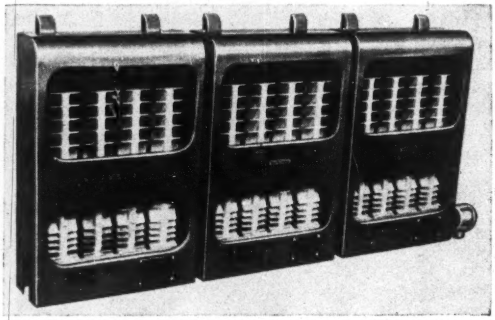
Left: Heat Pump
Above: Pipe Packaging

Packaging for Fin Pipe

HPAC 7—Method (patented) for protecting fin pipe or extended surface pipe during shop handling and shipping, in which cardboard cover tubing is slipped over entire length of fin surface — Proctor & Schwartz, Inc., 7th St. and Tabor Rd., Philadelphia 20. The pipe, thus protected, does not need the usual wooden box or crate with separators, the manufacturer states. Lengths or sections can be stacked on top of each other, and the method applies as well to sections of pipe made up with return bends. The packaging may be left on the pipe during installation, the cardboard then being slipped off the pipe, or cut through lengthwise with a rip cord provided.

Explosionproof Electric Heater

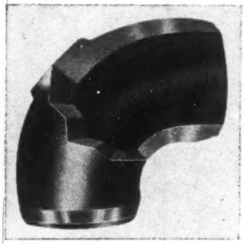
HPAC 8—"Electromode" 6000 watt convection type explosionproof heater designed for use in atmospheres containing gasoline, petroleum, naphtha, acetone, benzol, natural gas, etc., and approved by the Underwriters' Laboratories for use in Class 1 Group D hazardous locations — Electromode Corp., 45 Crouch St., Rochester 3.

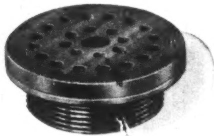


The heating element consists of a nickel chromium resistor wire, insulated and sheathed in a seamless metal tubing which is embedded in a one piece finned aluminum casting. This seals the element, eliminating fire, shock and burn hazards, the manufacturer states. Heaters are available in three models with ratings of 2000, 4000 and 6000.

Welding Pipe Fittings and Flanges

HPAC 9—"Key-Kast" alloy steel welding pipe fittings and flanges with thick walls throughout and added thickness at all areas of stress — Key Co., 2617 McCasland, East St. Louis, Ill. This construction provides structural strength and allowance against corrosion and erosion, the manufacturer states. The new line meets ASA, ASME and ASTM standards, and is available in low and intermediate alloys and various types of stainless steel. A boss is provided on all fittings for tapped openings.





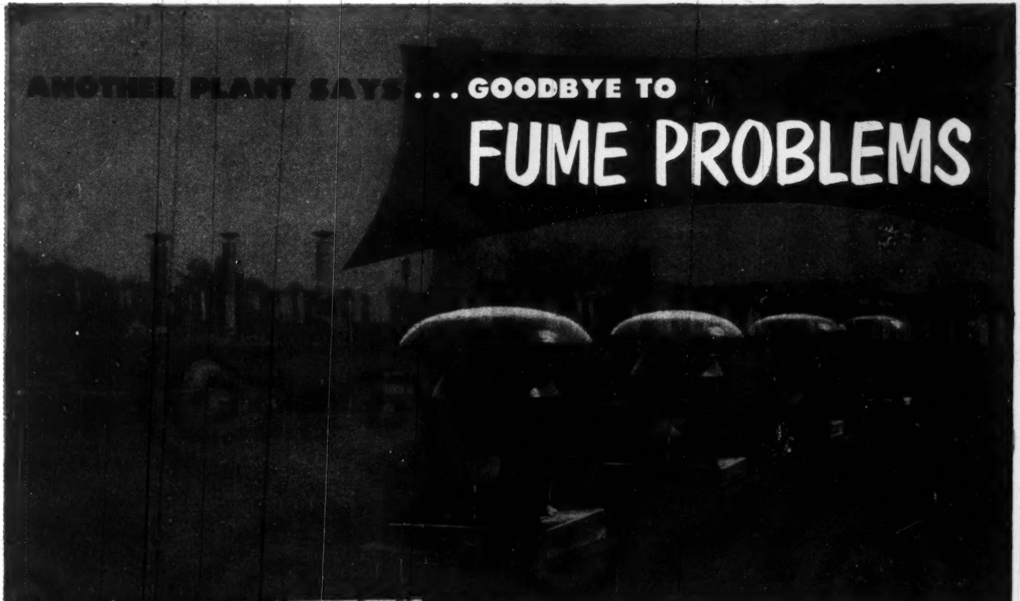
Left: Fitting
Above: Valve

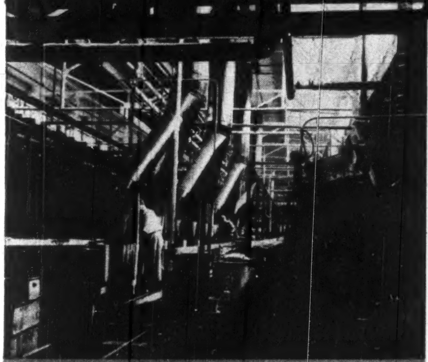
Plate Type Suction Valve

HPAC 10—"Garland" suction valve of the plate type for use in refrigerating machines using ammonia — Frick Co., Waynesboro, Pa. The new valves have moving parts weighing 1/16 as much as those in the company's poppet valves, and the ring plate has an opening on each side, giving the same port area with about half the lift, the manufacturer states. They are complete assemblies so

(*Continued on Page* 264)

ANOTHER PLANT SAYS . . . GOODBYE TO FUME PROBLEMS





ABOVE: Four Bifurcator Roof Ventilators installed at Winters & Crampton Corporation, Grandville, Michigan. LEFT: Inside the plant, showing plating-tanks and exhaust duct work leading to roof ventilators.

PROBLEM: To select the best way of exhausting corrosive fumes from tanks where refrigerator and stove hardware is plated.

SOLUTION: Four Bifurcator Roof Ventilators installed on roof with exhaust duct work leading to them from plating tanks.

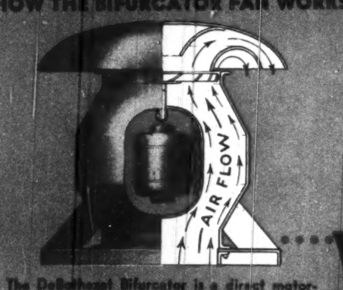
REASONS: "It was our choice to use this particular type of exhauster because of its simplified installation when compared to conventional centrifugal exhausters, which made it possible to omit elbows, sleeve band connections, discharge piping, and separate motor mounting and cover, which makes for a trim appearance. Ease of maintenance was also a consideration, as removal of weather top gives complete access to fan blade."

— Norman Davis, Plant Engineer
Winters & Crampton Corp.

RESULTS: "These four Bifurcator Roof Ventilators are doing a very satisfactory job of fume removal . . . performance is equal to, or in excess of, rated capacities."

— Norman Davis

HOW THE BIFURCATOR FAN WORKS



The DeBothezat Bifurcator is a direct motor-driven fan with a divided housing. Corrosive fumes are by-passed around the motor, which is mounted in a separate chamber, open to atmosphere but isolated from exhaust fumes. Bifurcator Roof Ventilators are equipped with weatherproof head and mounting base.

FREE BULLETIN *"Design Data for Lateral Tank Ventilation."* 32-page bulletin describes standard 2-sided tank exhaust, rear manifold exhaust and jet "push-pull" systems. Ask DeBothezat Fans representative for a copy or write our factory, Dept. HP-152.

BIFURCATOR
ROOF VENTILATORS

DE BOTHEZAT FANS DIVISION

American Machine and Metals, Inc., East Moline, Illinois

ASK THE AEROFIN MAN

For the Practical Answer to Your Heat-Exchange Problem . . .

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

There is a competent Aerofin heat-transfer engineer near you, qualified by intensive training and long experience to find the *right* answer to your own particular heat-exchange problem.

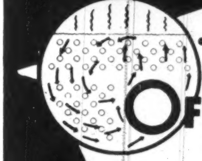
This specialized knowledge is there, ready for you to use to your greatest advantage. Ask the Aerofin man — and be right.

AEROFIN CORPORATION

410 South Geddes St., Syracuse 1, N. Y.

Check First with Dutton

FOR ONLY THE DUTTON ECONOTHERM
GIVES YOU OFF-CENTER FIRING

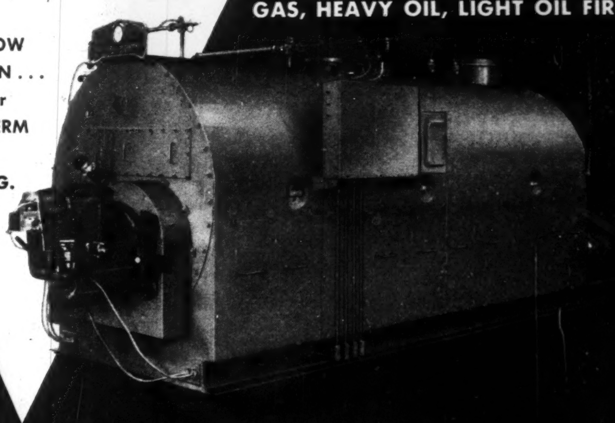


AND ...HERE'S THE EXTRA ADVANTAGE OF OFF-CENTER FIRING

Induces positive, fast water circulation in a rotary motion, resulting in uniform water temperature in shell . . . faster steaming . . . elimination of surging and priming . . . a steady water line at all times . . . higher quality, dry steam . . . and a higher column of water above the furnace. Every point makes sense — makes performance too!

CHECK NOW
with DUTTON . . .
write for
ECONOTHERM
Bulletin
EC-100G.

- COMPACT
- SELF-CONTAINED
- FULLY AUTOMATIC
- ROTARY COMBUSTION
- UNUSUAL EFFICIENCY, SAFETY
- GAS, HEAVY OIL, LIGHT OIL FIRING

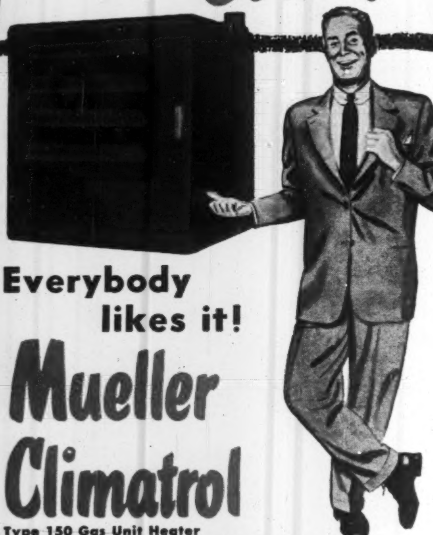


Other types and sizes —
5 to 250 h.p.
See the Yellow Pages
in Phone Book for
Dutton Representative.

Dutton BOILERS

DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO, MICHIGAN • BOILER BUILDERS SINCE 1880

It Must be Good!



Everybody likes it!

Mueller Climatrol

Type 150 Gas Unit Heater

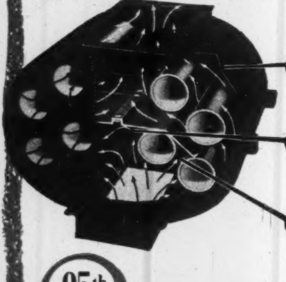
—superior Mueller Climatrol design sets new standards for unit-heater industry

Yes, unit-heater designs are following Mueller's lead — but the Mueller unit is still way out front. Your customers just can't beat it for extra value — longer life, greater operating economy.

What's more you can fit every application with the Type 150 (propeller fan type) and Type 151 (blower type) — with four input capacities: 60,000, 90,000, 120,000, and 150,000 Btu. AGA approved for all gases.

Get behind the Types 150 and 151. Proof of superiority is in the product. Sales come easy — installation is simple (units shipped pre-wired and assembled). Write for information . . . *L. J. Mueller Furnace Co., 2023Z W. Oklahoma Ave., Milwaukee 15, Wisconsin.*

E-45



Proof of Superiority

① **One piece — all welded heavy gauge steel:** No tie-rod, bolted, gasketed, or slip joints to leak, separate, or crack.

② **High crown sheet:** No flame impingement, no "hot spots." No joints or welds exposed to flame or path of flue gas.

③ **Uniform air flow and heat distribution:** Even flow of air insures maximum heat transfer and fuel economy.

95th Anniversary MUELLER • MILWAUKEE

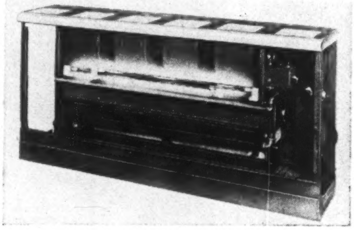
Mueller Climatrol

(*Continued from Page* 260)

designed that no loose parts can get into the cylinder, and are interchangeable with the former poppet valves in the company's ammonia compressors of the vertical enclosed type.

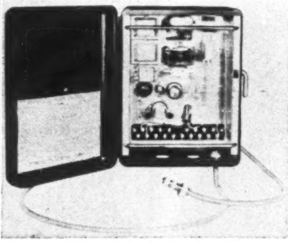
Classroom Unit Ventilators with Germicidal Lamps

HPAC 11—All models of "Draft Stop" and general purpose unit ventilators available with germicidal lamps for ultraviolet ray disinfection — Herman Nelson Div., American Air Filter Co., Inc., Moline, Ill. The lamps, an integral part of the equipment, double the amount of pure air available for each child in the classroom by killing airborne bacteria which spread respiratory diseases, the manufacturer states. Tests of the new equipment have been conducted at General Electric Co. laboratories.

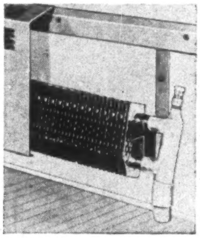


Flame Failure Safeguard

HPAC 12—System FP-4 "Fireye" photoelectric flame failure safeguard for protecting semi-automatic or manually fired gas, oil, and combination gas-oil burners — Combustion Control Corp., 77 Broadway, Cambridge 42. The system, composed of an electronic control and a scanner, cuts off fuel when the flame fails, and it may be wired to sound an alarm. The scanner, installed in a short length of standard ½ in. pipe, contains a photo-conductive cell that "sees" flames and responds to failure. The system operates on 115, 208 or 230 volts, 50 or 60 cycles. Ambient operating temperature of the scanner is 250 F, of the control, 125 F.



Flame Failure Safeguard

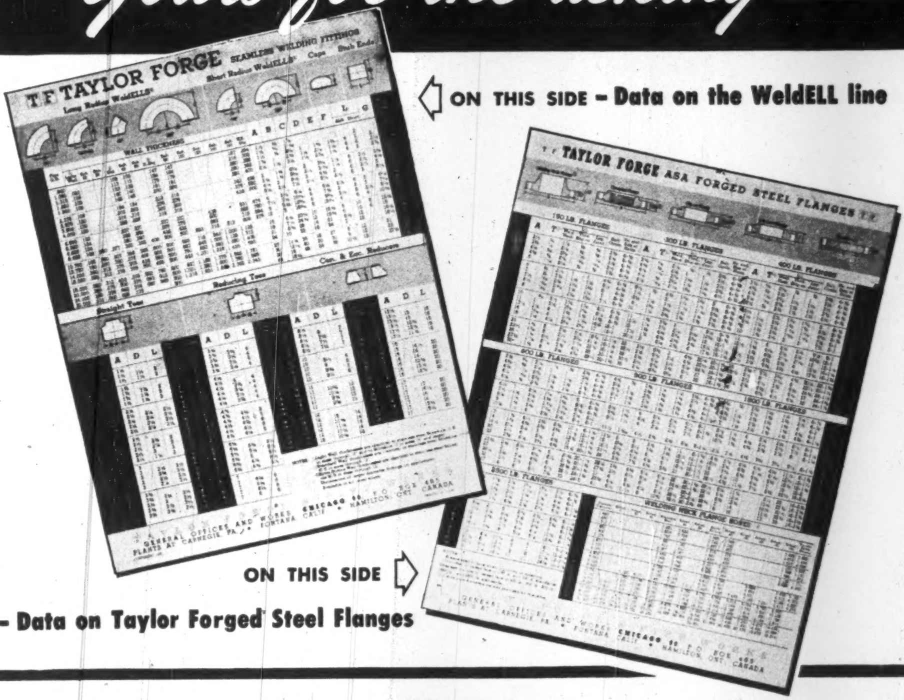


Radiation unit

Baseboard Radiation Unit

HPAC 13—"Bayce Heet" baseboard unit, bearing the IBR label, and rated at 1100 Btu at 215 F (4.6 sq ft EDR per lineal ft) — Brown Products Co., 97-12 Metropolitan Ave., Forest Hills, N. Y. The diagonally opposed fin tips are folded down and the entire heating element (fin and tubes) is tilted, this arrangement being designed to allow more efficient air circulation with lower fuel consumption.

Yours for the asking—


TF TAYLOR FORGE
SEAMLESS WELDING FITTINGS
TAYLOR FORGE ASA FORGED STEEL FLANGES

ON THIS SIDE – Data on the WeldELL line

ON THIS SIDE

– Data on Taylor Forged Steel Flanges

A VOLUME OF DATA

. . . covering welding fittings and forged steel flanges . . .

ON A SINGLE SHEET

Here is just about the handiest tool ever devised for the pipe designer. Data on welding fittings and flanges that otherwise could be found only by plowing through many catalog pages and tables have been ingeniously condensed on the two sides of the durable letter-size card illustrated above.

One side covers the broad WeldELL line of Taylor Forge welding fittings. For every nominal pipe size, ½" through 30", it shows the wall thickness for every weight of every fitting in every available material. It also shows all required dimensions of all types of fittings.

The other side covers the world's most complete line of forged steel flanges. For every nominal pipe size, ½" through 24", it gives all essential dimensional and bolting data for all types of flanges in all weights. A particularly useful table (see reproduction) is that showing welding neck flange bores which enables you to determine the I.D. of any nominal pipe size without separate calculation. Thus the sheet gives you O.D. and I.D. of any weight of pipe.

The card is varnished to make it stand the steady usage you are certain to give it. To obtain your copy see your Taylor Forge distributor or **MAIL THE COUPON.**

TF

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS
General Offices and Works: P. O. Box 485, Chicago 90, Ill.
Offices in all principal cities.
Plants at: Carnegie, Pa.; Fontana, Calif.; Hamilton, Ont., Canada

Please send me one of your fitting and flange sheets:

NAME____________________

POSITION____________________

COMPANY____________________

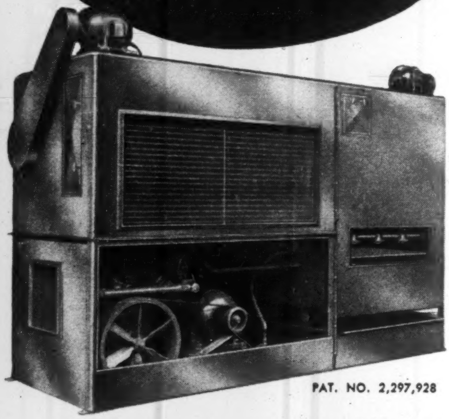
STREET ADDRESS____________________

CITY__________ZONE_____STATE__________

510-0152 Mail to Taylor Forge & Pipe Works, P. O. Box 485, Chicago 90, Ill.

For day in, day out
DEPENDABILITY
you can't beat a

GOVERNAIR
COMPLETELY PACKAGED
AIR CONDITIONER

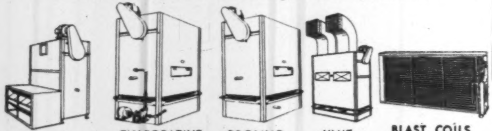


PAT. NO. 2,297,928

Name your job . . . any air conditioning job requiring from 3 to 50 tons . . . and you'll find that you can't beat a Governair system for day in, day out dependability.

Governair Packaged Air Conditioners are designed to operate at peak efficiency—with all parts precision-matched to work together. And they're built to give years and years of low-cost, trouble-free service.

Choose Governair . . . and you choose the best!



[illegible]

GOVERNAIR

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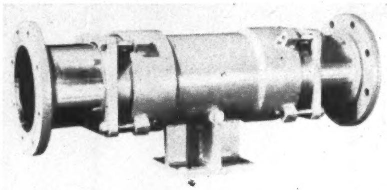
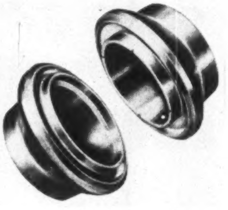
Expansion Joints

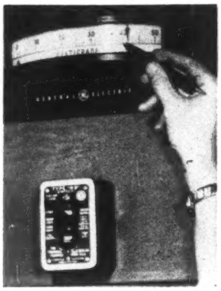
HPAC 14—Internally guided slip type expansion joints — The Royalton Co., Inc., Gasport, N. Y. Both single and double joints in 150 lb and 300 lb steel are offered in sizes from 3 to 20 in. Bases are optional in the single joints, standard in the double. Ends are beveled for welding, and service connections can be supplied in all sizes and types. Slips for 4 in. traverse are standard, but 8 and 12 in. traverse per slip can be furnished.



Welding Coupling

HPAC 15—"SF" (scale-free) welding coupling, consisting of two forged halves, designed to eliminate welding scale from piping systems — Tube Turns, Inc., 224 E. Broadway, Louisville 1. The ends of the hubs are prepared for welding to pipe or welding fittings. When the halves are brought together, the tongue of one slips into the groove of the other. A circumferential cavity directly beneath the beveled welding area prevents burn-through, formation of icicles in the interior, and scaling, and insulates the interior from welding heat, the manufacturer states. Since the hubs are short, any scale or protrusions formed by the two attachment welds can be reached and removed before the coupling is connected. The coupling is available in sizes from $1\frac{1}{4}$ through 12 in., and in carbon steel, stainless steel, aluminum and other metals and alloys.





Above: Coupling
Right: Thermometer

Resistance Thermometers

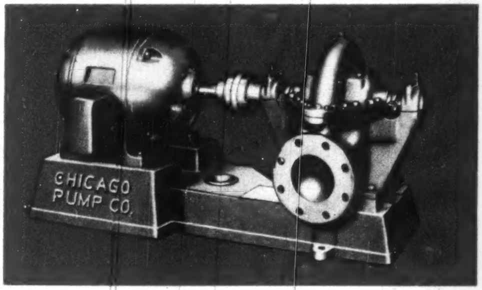
HPAC 16—Resistance thermometers, designed for indication and control of temperatures ranging from —100 to 300 F, and applicable in a variety of industrial processes — General Electric Co., Meter and Instrument Dept., Schenectady 5. They are available in three types: a resistance-thermometer indicator, a two position controller or protector (illustrated), and a three position controller, each type being designed for either flush or surface mounting. All thermometers use the same basic mechanism, a crossed coil moving element and a $3\frac{1}{4}$ lb alnico V magnet. They are enclosed in dust tight, moisture resistant case and cover assemblies that permit use in moist or contaminated atmospheres.

(*Continued on Page* 271)

Chicago PUMPS

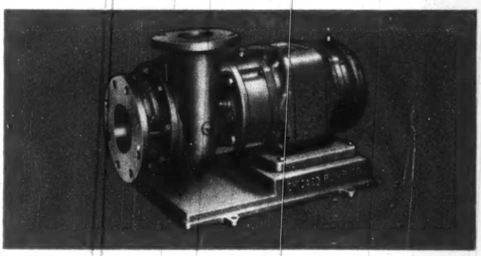
ARE BETTER PUMPS FOR EVERY BUILDING SERVICE

CIRCULATING PUMPS



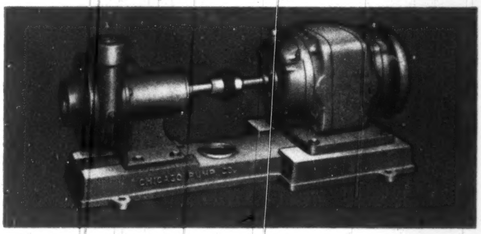
TYPE D, DOUBLE SUCTION, HORIZONTALLY SPLIT CASE PUMP

For house pump, fire and booster service. A ruggedly built, heavy duty pump for long trouble-free service. The rotating assembly may be inspected without disconnecting the piping. Capacities up to 1900 G.P.M.—heads to 530 ft. Described in Bulletin 101.



TYPE N, CLOSE COUPLED BOOSTER PUMP

Designed to handle the toughest pumping jobs efficiently and in the least possible space. May be mounted in any position as long as the motor is not lower than the pump. Provided with leak-proof mechanical seal. Capacities up to 500 G.P.M.—heads to 215 ft. Described in Bulletin 108.



TYPE B, PEDESTAL MOUNTED, SIDE SUCTION PUMP

Built to the same exacting engineering standards as the Type N Pump and with the same capacity and head. The flexible coupling drive permits easy field servicing and the use of customer's choice of motor manufacture. Described in Bulletin 107.

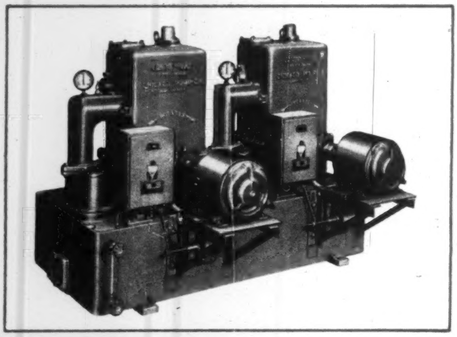
For circulating service, heating, bilge or sewage pumping Chicago equipment i the best available Each pump is specifically designed to do the particular job and do it right. Over 40 years experience with pumps for every application is built into every unit.

For "worry proof" pumping at all times—specify Chicago Industrial Pumps.

CHICAGO INDUSTRIAL PUMPS

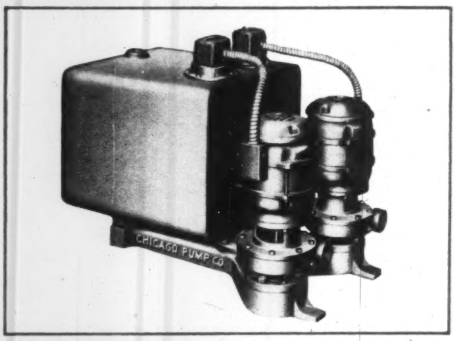
Chicago
PUMPS

ARE BETTER PUMPS FOR EVERY BUILDING SERVICE



DUPLEX CONDO-VAC RETURN LINE VACUUM AND BOILER FEED PUMP

Specifically designed for vacuum heating systems. The water capacity of the Condo-Vac remains constant up to the boiling point. The air capacity remains constant to the evaporation point. Pressures up to 40 lbs. Capacities from 2500 to 150,000 EDR. Described in Bulletin 270.



SURE RETURN CONDENSATION PUMP & RECEIVER

For systems up to 75,000 EDR and for low and medium pressures. Available in either single or duplex units. The base serves as a large capacity manifold through which the condensate flows by gravity from the receiver to the pump. The Sure Return will not steam bind. Described in Bulletin 250.

CHICAGO PUMP COMPANY

BUILDING AND INDUSTRIAL DIVISION

2300 WOLFRAM STREET CHICAGO 18, ILLINOIS

HEATING PUMPS

For every heating system get the pump that is specifically designed for the particular job. For below floor returns, for low vacuum systems, for small capacity high pressure requirements, for any standard heating system, or any unusual condition, there is a CHICAGO Heating Pump that will do the job better. All ratings and receiver capacities meet or exceed ASHVE standards.

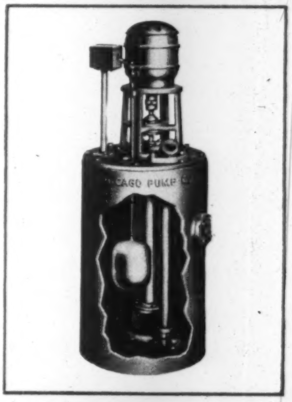
TYPE AVC CONDENSATION PUMP & RECEIVER

Heavy cast iron receiver with low inlet for floor mounting or shallow pit. Sets on floor—no foundation bolts necessary. Weight of unit and piping hold unit firmly in place. For 500 to 10,000 EDR and 10 to 30 lbs. pressure. See Bulletin 245.

CHICAGO PUMP CO

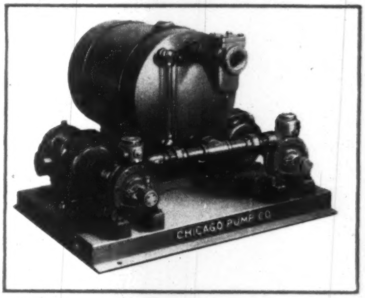
TYPE CLL1 VERTICAL CONDENSATION PUMP & RECEIVER

Specifically designed for low return service and underground installations. Flanges are accurately finished and gasketed to prevent steam leaks. Pump and receiver are shipped as a unit, ready to install. For 1000 to 40,000 EDR and 10 to 25 lbs. pressure. Described in Bulletin 255.



DUPLEX FC CONDENSATION UNIT

Single or duplex units are specifically designed for operating conditions where pressures are high and capacities relatively small. For duty up to 50,000 EDR and discharge pressures up to 150 lbs. Described in Bulletin 260.



CHICAGO INDUSTRIAL PUMPS

Chicago PUMPS

ARE BETTER PUMPS FOR EVERY BUILDING SERVICE

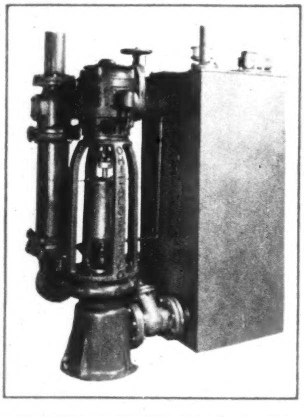
BILGE PUMPS AND SEWAGE EJECTORS

For reliable heavy duty service engineers consistently specify CHICAGO Bilge Pumps and Sewage Ejectors. Bilge pumps from 1¼″ to 8″ with capacities from 5 to 5000 G.P.M. Sewage Ejectors from 3″ to 8″ with capacities from 50 to 5000 G.P.M. In addition to the pumps illustrated, dry pit open shaft pumps are also available. All closed shaft pumps have an intermediate guide bearing for every 3 to 4 ft. of shaft, depending on the pump length. The upper thrust bearing is located well above the floor level. Tongue and groove construction throughout insures accurate alignment.

CHICAGO
INDUSTRIAL
PUMPS

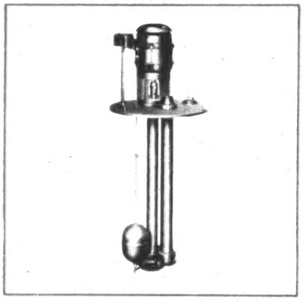
FLUSH-KLEEN SEWAGE EJECTOR TYPE S

The only positively clog-proof sewage ejector. Flush-Kleens are furnished as a complete package, as illustrated, or in duplex for submerged or dry well installations. Described in Bulletins 122-C, 122-S.



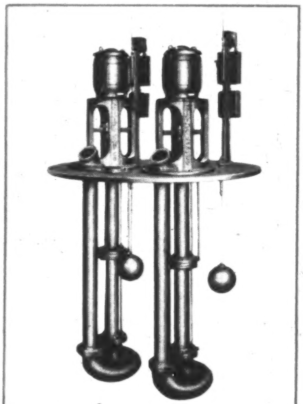
TYPE LG12 AUTOMATIC ELECTRIC BILGE PUMP

Specifically designed to drain basements, pits and sumps. Centrifugal volute pump with open bronze impeller. A cast iron strainer of large area surrounds the suction opening. Described in Bulletin 118.



DUPLEX VERTICAL CLOSED SHAFT NON-CLOG PUMPS

These pumps are suitable for either bilge or sewage service. Complete control equipment is mounted on the basin cover. Each pump is mounted on separate floor plate to allow easy removal of either pump for servicing. Described in Bulletin 124.



CHICAGO PUMP COMPANY
BUILDING and INDUSTRIAL DIVISION
2300 WOLFRAM STREET — CHICAGO 18, ILLINOIS

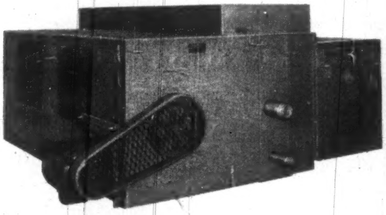
Condo-Vac, Sure Return, AVC, LVC,
Fire, House & Circulating Pumps
Pneumatic & Tankless Water Systems

Flush-Kleen Sewage Ejectors
Little Giant & Non-Clog Bilge Pumps
Pumps for every industrial use

(Continued from Page 266)

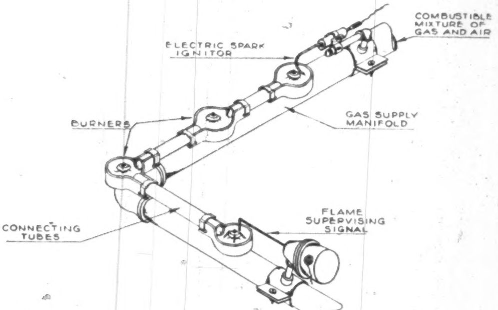
Heating and Ventilating Units

HPAC 17—Units with air volumes of from 400 to 21,000 cfm, designed for heating and filtering recirculated air, fresh air, a mixture of both, or for ventilation only — Kennard Corp., 1819 S. Hanley Rd., St. Louis 17. Conventionally used for heating large spaces or as central station units for heating many small rooms, they also can be utilized for a variety of special and process applications. Wall, floor or ceiling mountings are offered. Mixing box and dampers, face and bypass dampers, humidifiers, etc., are among the optional equipment available.



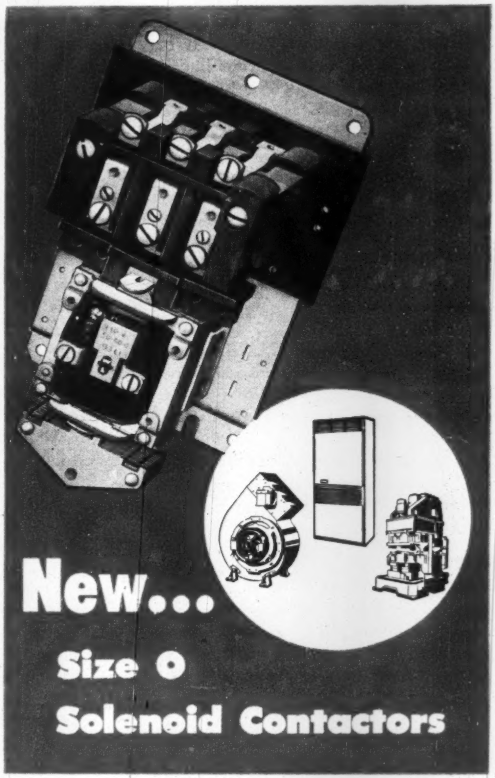
Ignition System for Industrial Gas Burners

HPAC 18—System for igniting "Radiant-Heat" industrial gas burners — Burdett Mfg. Co., 3433 W. Madison St., Chicago 24. The burners, arranged in series upon a gas supply manifold, are ignited at one end by an electric spark when a manual push button is depressed. The closed circuit energizes the automatic gas supply valve at the same time, permitting gas to reach all burners by means of the gas supply manifold and connecting tubes. A flame supervising device is located at the last burner (end opposite the spark igniter). If its contacts are not closed by the flame in the ignited burner, on release of the push button the automatic gas supply valve will close, shutting off the supply. If the contacts are closed, as in normal operation, on release of the button the automatic supply valve remains energized and open by receiving current through the flame supervising device circuit.



Heat-Absorbing Plate Glass

HPAC 19—Low expansion type, heat absorbing plate glass available for fabrication into "Thermopane" units — Libbey-Owens-Ford Glass Co., Nicholas Bldg., Toledo 3.



. . . A-C or D-C . . . multi-pole construction . . . many more uses

Now you can get fast, positive, consistent operation on a *wide range* of load and control circuits . . . from the finest design of solenoid contactor on the market.

This new Size O a-c contactor brings Ward Leonard's line of solenoid contactors into the 15 ampere range. And it comes with as many as 5 poles. Double-break silver contacts may be interchanged to form normally-open or normally-closed contacts as desired.

Operating coils are interchangeable with Size 1 contactor coils. Available also with d-c "power plants".

Write for Bulletin 4458. WARD LEONARD ELECTRIC CO., 24 South Street, Mount Vernon, N.Y. Offices in principal cities of U. S. and Canada.

WARD LEONARD ELECTRIC COMPANY
Result-Engineered Controls Since 1892
RESISTORS • RHEOSTATS • RELAYS • CONTROL DEVICES

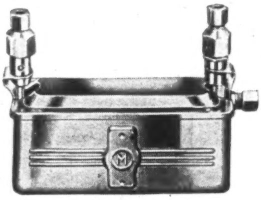
The quarter-inch glass excludes 61 percent of total sun radiation, but transmits 71 percent of average daylight when used in the units with one light of the conventional quarter-inch polished plate glass, the manufacturer states. In some special cases, a combination unit of two lights of the new glass may be used to exclude 78 percent of solar radiation and transmit 62 percent of daylight. The glass, used in windows, is designed to reduce initial and operating costs of air conditioning equipment. Windows may also be glazed with the glass to reduce the input of heat.

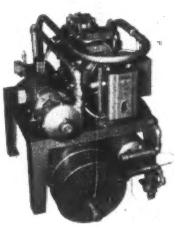
Air Compressor

HPAC 20—V type, four cylinder, two stage air compressors in new sizes of 3 and 5 hp — The DeVilbiss Co., 300 Phillips Ave., Toledo 1. These augment the line of 7½, 10 and 15 hp units. All sizes are available for either 125 or 175 lb pressure service, the first for industrial use, or for spray painting, the second for use in service stations, etc., where a higher range is required for operation of lifts and other air using tools. Automatic pressure switches start the motor when the pressure drops and stop it when the desired maximum has been reached. ASME air receivers and high starting torque electric motors are standard.

Humidifiers

HPAC 21—Series 900 "Atomick" air operated humidifiers, which will operate in conjunction with unit heaters (gas, steam or water) or independently — Maid-O'-Mist, Inc., 3217 N. Pulaski Rd., Chicago 41. In a typical installation, a humidifier is placed in front of a gas fired unit heater just above the air flow from the heater. The air and water to the humidifier are supplied through ¼ in. OD copper tubing. A solenoid valve, a pressure reducing valve and a strainer are placed in the air line to control the flow. The solenoid valve is connected through a transformer or direct to the thermostat that controls the unit heater fan and gas valve. When the thermostat calls for heat, the humidifier automatically comes on with the heater. On multiple types of installations, a humidistat controls the operation of the humidifiers. When independent installations are required, a different piping plan is followed. The humidifiers can also be used to spray chemicals, etc., through piping systems, and for other process applications.

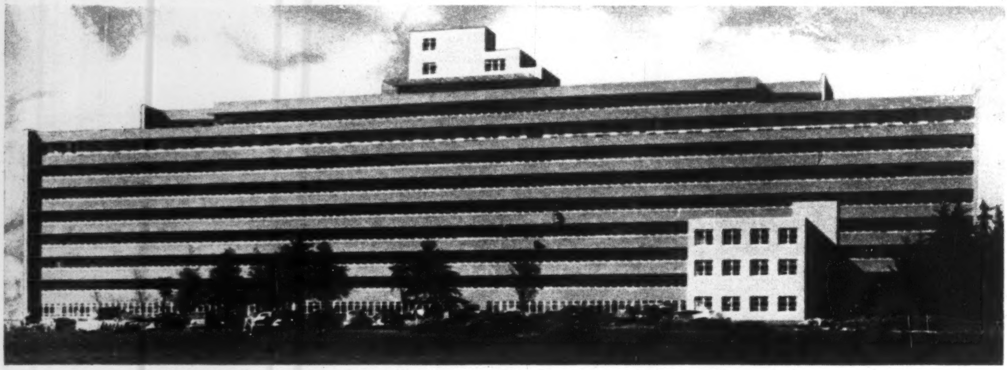




Above: Humidifier
Right: Heat Pump

Heat Pump Air Conditioning Units

HPAC 22—"Flow-Temp" heat pumps, year-around air conditioning units which supply heat from any outside source such as air, water or the ground, without utilizing standard fuels — Acme Industries, Inc., Jackson, Mich.



U. S. Veterans Hospital, Seattle, Washington — Heated by two Ray fully automatic rotary-type oil burners.

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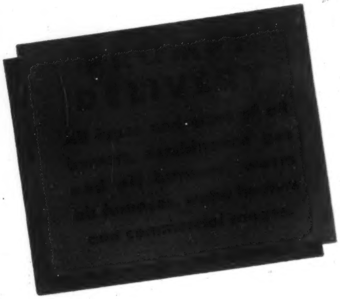

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Always Progressing

LOOKING ahead into the New Year, we at Independent Register take the opportunity to sincerely thank the Heating Jobbers and Installers who have given us their patronage over the past 53 years.

Only the good will and the support of our many friends and customers have made possible the continuance of our slogan: "Always leading—Always progressing."

Immediate personal attention is given to all orders—large or small. *We intend to keep it that way.*

Dependable service and prompt deliveries have been a motto with us. *We intend to keep it that way.*

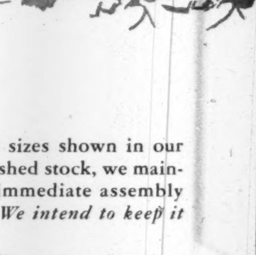
While not all styles and sizes shown in our catalog are carried in finished stock, we maintain adequate parts for immediate assembly and prompt shipment. *We intend to keep it that way.*

Independent "Fabrikated" construction provides uniformity of design in wall, baseboard and floor registers and grilles. *We intend to keep it that way.*

The Independent catalog* details and describes the complete Independent line for your convenience and ordering.

For 1952 as well as the years that follow—we intend to do our utmost to continue to deserve your support and good will.

**If you do not have a copy, your request will place one in the mail to you—promptly.*



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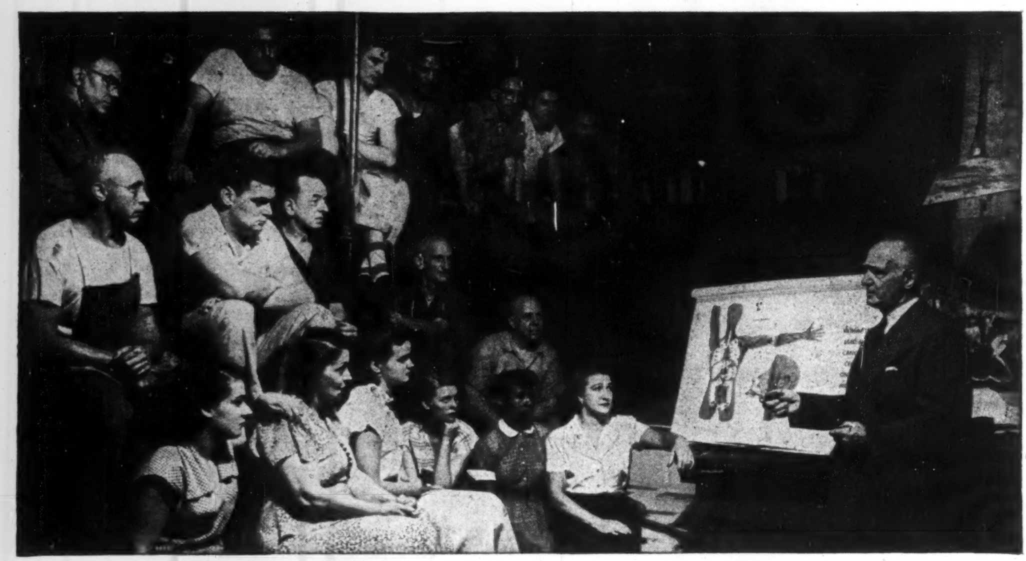


On the job!

Our volunteer speakers are saving thousands of lives *today* . . . in factories and business offices . . . at neighborhood and civic centers . . . at social, fraternal and service group meetings all over this land . . . by showing people what they can do to protect themselves and their families against death from cancer.

In laboratories and hospitals, from coast to coast, our volunteer dollars are supporting hundreds of research and clinical projects that will save countless more lives *tomorrow*.

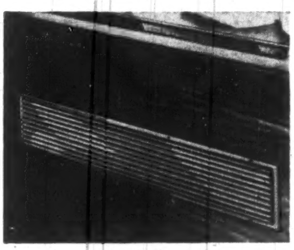
To find out what you yourself can do about cancer, or if you want us to arrange a special educational program for your neighbors, fellow-workers or friends, just telephone the American Cancer Society office nearest you or address your letter to "Cancer" in care of your local Post Office. One of our volunteer or staff workers will be on the job to help you.

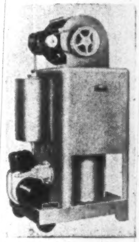
American Cancer Society

Air is drawn in through pipes which lead outside from the unit, and heat is absorbed from the air through the evaporation of a refrigerant gas, "Freon." When the vapor is compressed, it releases heat, which is circulated. For summer operation, the cycle is reversed by means of an automatic valve. Heat and moisture are then taken out of the inside air, and discharged outdoors. The unit assures dust and pollen filtration, the manufacturer states. It is available in several sizes ranging from 2 to 5 hp.

Convector Grilles

HPAC 23—Custom designed lower wall convector grilles (sold at standard prices) designed to withstand heavy use — Titus Mfg. Co., Waterloo, Ia. Louvers are spaced closely to prevent waste paper, etc., from being dropped between them. Grilles may be made to any size, have over 70 percent free area, can be installed in marble, tile or other special surfaces, and have extra-heavy support bars on 6 in. centers for added strength, the manufacturer states. Damper and knob control are available.


Grille


Heater

Space Heater

HPAC 24—Model PW-140 space heater (140,000 Btu) utilizing warm air blown out of the base along the floor, which is designed to create a 6 ft high heat blanket and to spray heat from all sides across the floor — Fageol Heat Machine Co., 5725 Mt. Elliott Ave., Detroit 11. The heater, which can be located in the center of large areas, is designed to heat workers in areas up to 3000 sq ft of confined space or 1600 sq ft of open space. It eliminates the need for heating overhead areas in order to keep occupants warm, the manufacturer states. The model burns regular furnace type fuel oil of No. 3 or lighter grades, or kerosene. Self contained, it requires no flue or chimney, and has an attached 6 gal fuel tank. Dimensions are 21 x 33 x 58 in. high. A 200,000 Btu model also is available.

Room Air Conditioner

HPAC 25—"Vornado" room air conditioner for cooling — O. A. Sutton Corp., 1812 W. Second St., Wichita. The conditioner was displayed for the first time at a nationwide distributors' meeting held in Wichita in November, 1951. Scheduled for production early this year, it is the result of more than three years of research.

Flow Control Valve

HPAC 26—Horizontal flow control valve in three sizes, 1, $1\frac{1}{4}$, and $1\frac{1}{2}$ in., with threaded inlet connections and union outlets — H. A. Thrush & Co., Peru, Ind. Since the valve can be installed in a horizontal flow main, the main

You can't jam the new RIDGID 65R

Really streamlined pipe threading with this RIDGID self-contained die stock
RIDGID
2
1½
1¼
1

Right Here is the simple device that makes 65R automatically *JAM-PROOF*.

● You don't have to watch it—lead screw can't jam on workholder. New jam-proof drive plate automatically kicks out driving ratchet pawl when standard length thread is cut. Your recent model 65R easily converted—just buy new drive plate, put in place of old plate. Perfect threads on 1" to 2" pipe with one set of 4 high-speed steel dies—sets to pipe size in 10 seconds, mistake-proof self-centering workholder sets instantly! Buy the new jam-proof RIDGID 65R at your Supply House.

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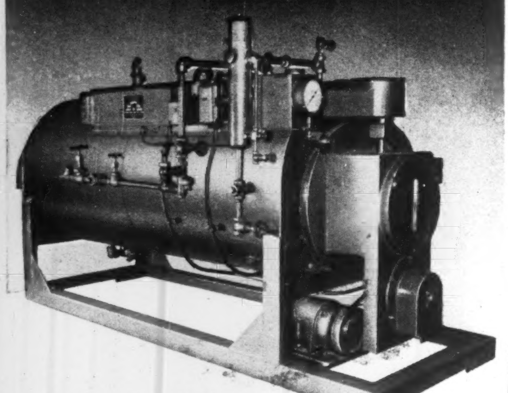
★ Work-Saver Pipe Tools ★

Steam at low cost

Continental



Complete size range from 10 to 500 HP, high or low pressure

Savings you make with a Continental Packaged Steam Generator rapidly repay your initial investment. First, you save on installation. The unit is factory assembled and tested, ready to operate after simple service connections in your plant. Second, you save on fuel. The Continental operates with guaranteed efficiency of at least 80%. Independent tests prove the steam generated contains less than 1% moisture.

Of proven Scotch Marine design, this is a 2-pass boiler requiring far less refractory than ordinary 3- and 4-pass boilers. The fuel is burned in furnace entirely surrounded by water, and the gases pass spirally through 3″ tubes, giving maximum heat transfer, low flue gas temperature, and high efficiency.

Third, you save on maintenance. Boiler front and back can be opened in 15-20 minutes, simplifying cleaning and servicing. Many users report these and other major savings with the Continental in heating and processing.

The unit is completely automatic and equipped with efficient burners for heavy oil, light oil, gas, or a combination. May we send you literature that fully describes it? Call or write today.

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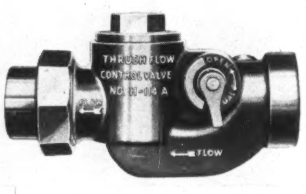
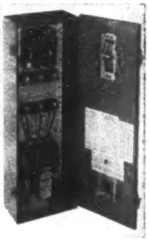
can be carried near the basement joists or ceiling. On zoned installations, a flow control valve with vent tube is used at the boiler, and a horizontal valve is located near each zone. The valves have a $\frac{1}{2}$ in. tank tapping near the inlet to take air directly out of the main into a pressure tank or to an automatic air vent.





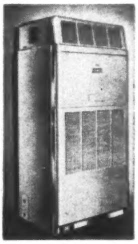
Above: Valve
Right: Starter

Motor Starter

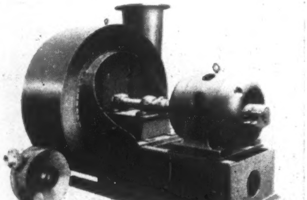
HPAC 27—Combination across-the-line motor starter with fusible disconnect switch — Westinghouse Electric Corp., Box 2099, Pittsburgh 30. It is available in NEMA sizes O through Z. The disconnect switch features visible blades and de-ion arc quenchers. Starters are available for 3 phase operation, up to 600 volts, 60 cycles.

Self Contained Summer Air Conditioner

HPAC 28—Self contained air conditioner ($7\frac{1}{2}$ ton capacity) for cooling spaces such as average size retail stores and general offices — Frigidaire Div., General Motors Co., Dayton 1. It is 40 in. wide, 28 in. deep and $86\frac{3}{8}$ in. high, delivers 2700 cfm of conditioned air, and has an air throw of 75 ft, the manufacturer states. Only electrical, water, and drain connections are necessary. The unit can be manually operated, or a control knob can be set for automatic operation. The $7\frac{1}{2}$ hp compressor located in the bottom of the cabinet is a new sealed reciprocating type with direct drive operation. A two row steam heat coil for heating purposes is available as accessory equipment, and the unit can be installed remotely with ductwork, if desired.



Air Conditioner



Blower

Steel Fabricated Blowers

HPAC 29—Fabricated steel blowers limited in size only by available manufacturing space, with standard models ranging up to 200 hp — Billmyre Blower Div., Lamson Corp., Syracuse 1. Three styles are offered: the multi-stage and single stage models operating at 3500 rpm, and another, at 1750 rpm. Standard outlet pipe sizes run from 4 to 24 in. The smaller models (through 10 hp) are useful for mezzanine or elevated mounting in either vertical

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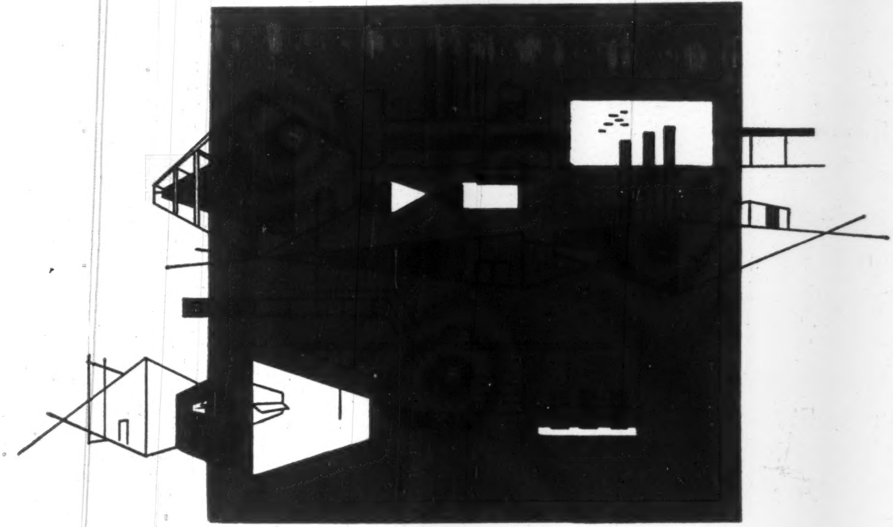

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Versatile Unarco Amocel brings many proved advantages to the broad fields of general service, for—like Unarco's higher-temperature insulation, Unibestos—it's light, resilient, strong; won't pulp, powder, wash-off, or shatter. It withstands impact and vibration; is unaffected by moisture, steam, fumes, or the usual acids. No breakage in transit. Easy to cut and fit on-the-job. May be removed and reapplied repeatedly without damage or loss of efficiency. Insulating with Amocel is quick and clean—saves maintenance time and money. Get all the facts today.

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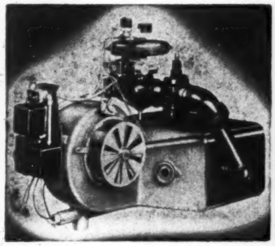
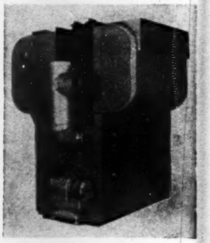
or horizontal positions. Designed on a standard basis for air only, the blowers can be adapted for corrosive or explosive gases. Blower outlets may be oriented to any of 14 positions. Delivered air pressures up to 3 psi (5.3 in. mercury) may be obtained, the manufacturer states. Power consumption is directly proportional to air volume.

Forced Draft Burner

HPAC 30—Model 214 forced draft conversion burner for use in industrial or commercial buildings, in 11 capacities ranging from 400,000 to 20,000,000 Btu per hr input — Bryant Industrial Div., 17825 St. Clair Ave., Cleveland 10. It is shipped factory wired and assembled as a unit. Such controls as automatic electric ignition and electronic flame failure protection, "on-off" or "throttling-off" type diaphragm valves, constant air to gas ratio shutter, etc., are standard. Pilot operation is completely automatic with electric spark ignition.





Year Round Air Conditioners

HPAC 31—1952 year round air conditioners that operate on oil as well as gas and steam — Servel, Inc., Evansville, Ind. The new oil operated unit (illustrated) uses a single source of heat for both summer cooling and winter heating, and it dehumidifies the air in summer, humidifies it in winter, and cleans and circulates it all year. It has a cooling capacity of 5.4 tons per day, and a heating output of 96,000 Btu per hr, the manufacturer states. Later in the year, the company will produce oil operated units of 3.3 tons per day cooling capacity and 96,000 Btu per hr heating output, and 5.4 ton cooling with 144,000 Btu per hr heating output. Also included in the new line are a self contained, steam operated 5.4 ton summer air conditioner, a 5.4 ton absorption type refrigeration unit, and a 25 ton steam operated water chiller.

Cooling Assembly

HPAC 32—Assembly plan for combining multiples of 5.4 ton cooling units into heavy duty air conditioning systems — Servel, Inc., Evansville, Ind. The basic unit is of the absorption refrigeration direct expansion type which uses water as a refrigerant in a hermetically sealed system. It has no motor, compressor or moving parts. Steam from a gas operated generator circulates the refrigerant in the cooling system. According to the manufacturer, a year of field testing determined the practicability of combining from two to forty or more of these units into systems which will meet large cooling requirements, and in which gas can be used to supply the energy.

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DEPENDABILITY

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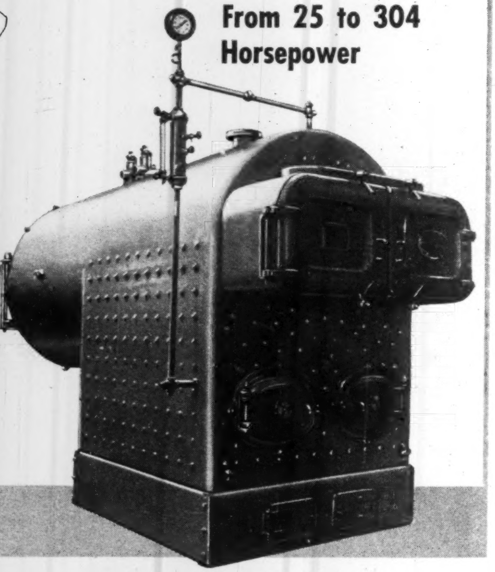

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Firebox BOILERS

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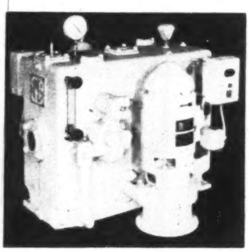
Vacuum Heating Pump

HPAC 33—Vacuum heating pump with leakproof design intended to eliminate servicing and maintenance costs — Byron Jackson Co., P.O. Box 409, Bethlehem, Pa. This is a single impeller, centrifugal pump with cast iron receiver and rustproof parts. The impeller and other parts can be removed for inspection without disturbing the pump casing or service piping connections. There is a vertically accessible inlet strainer. No pitting or auxiliary storage tanks are needed. The pump is a Charles F. Ames design.



Pump

Humidifier

Self-Contained Humidifier

HPAC 34—Model H-1 packaged self contained humidifier, for offices and homes, which operates on the evaporative principle, eliminating need for automatic humidistat or other controller — Tempmaster Corp., 1338 McGee St., Kansas City, Mo. A small motor driven pump submerged in the compartment forces water up through a tube to the top of the humidifier, where it is distributed to the humidifier pack in the rear of the unit. Circulating water keeps the pack surfaces wet. A fan draws air from the room in through the pack where it absorbs only the moisture that it needs, the manufacturer states. Humidified air is distributed up through the top of the cabinet. The unit operates on 110 volt, 60 cycle, alternating current. It is 23 in. high, 14 in. wide, 12 in. deep.

Finned Radiation Units

HPAC 35—"Airfoil" finned radiation heating units for industrial, commercial, and institutional applications—Radiant-Ray Radiation, Inc., New Britian, Conn. Designed for use with hot water heating installations or steam heating systems, the line is available in three types: one consisting of 1 in. copper tubing with 3¼ x 3¼ in. aluminum fins; another with 1¼ in. standard steel pipe and 3 x 4 in. steel fins; and a third of 2 in. standard steel pipe fitted with 4 x 4 in. steel fins. All may be used singly or in tiered installations.

Synchronous Motor

HPAC 36—Small synchronous motor which operates on the reluctance principle, and has no brushes, slip rings, rotating coils or permanent magnet—Allis Chalmers Mfg. Co., 1171 S. 70th St., Milwaukee 1. It can be built to operate continuously at any voltage below 250 volts, either single phase or polyphase. A typical motor is 4 in. in diameter by 2⅜ in. long, weighs 2.6 lb, and develops 8 oz-in. starting torque and 0.8 in. synchronous torque. It can start and pull into step at any frequency from 10 to 400 cycles, the manufacturer states.

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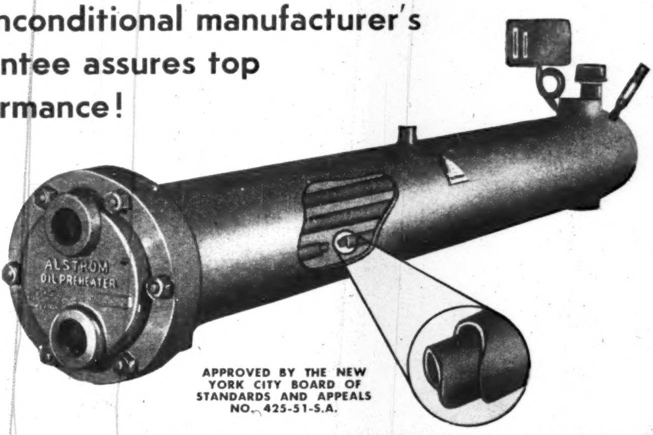
. . . unconditional manufacturer's guarantee assures top performance!



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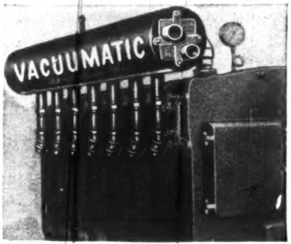

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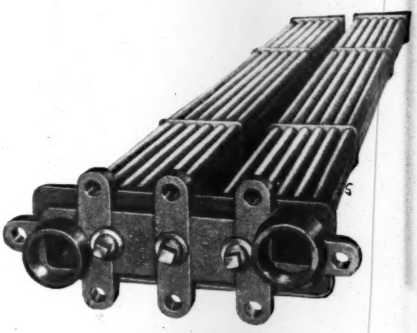

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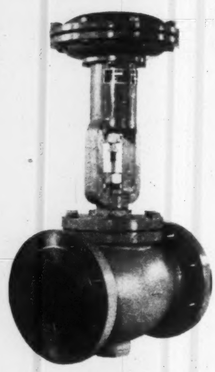

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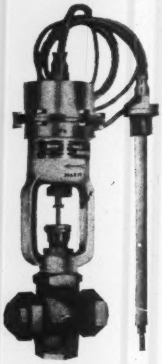

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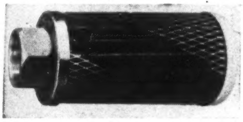
Fitting for Installation of Fin Tube Baseboard Radiators

HPAC 37—"Specialtee" fitting, for installing baseboard fin tube radiators, with already tapped air vent opening in return fitting which eliminates need for bushing, or drilling and tapping in installing air vent valve — General Fittings Co., Dept. 80, 118 Georgia Ave., Providence 5. Also available without air vent opening, the fitting allows room for installation of a straight pattern, union type valve on the supply end. Its stubbed off riser opening extends 1⅛ in. below the radiator centerline.



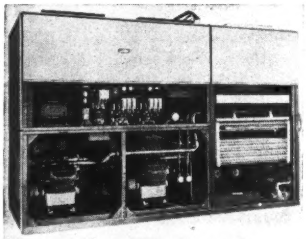
Above: Filter

Left: Fitting

Filters for Liquids in Hydraulic and Low Pressure Systems

HPAC 38—Synclinal filters in 75 and 100 gpm models, for hydraulic and low pressure liquid recirculating machinery requiring large filter capacities—Marvel Engineering Co., 625 W. Jackson Blvd., Chicago 6. They are permanent (cleanable) and are available in both line and sump types. The 75 gpm model is 12½ in. overall, including the coupling nut (which fits a 2½ in. pipe), and 6 in. in diameter. The other model is 14 in. overall and 6½ in. in diameter.

Air Conditioning Unit with Two Refrigeration Circuits

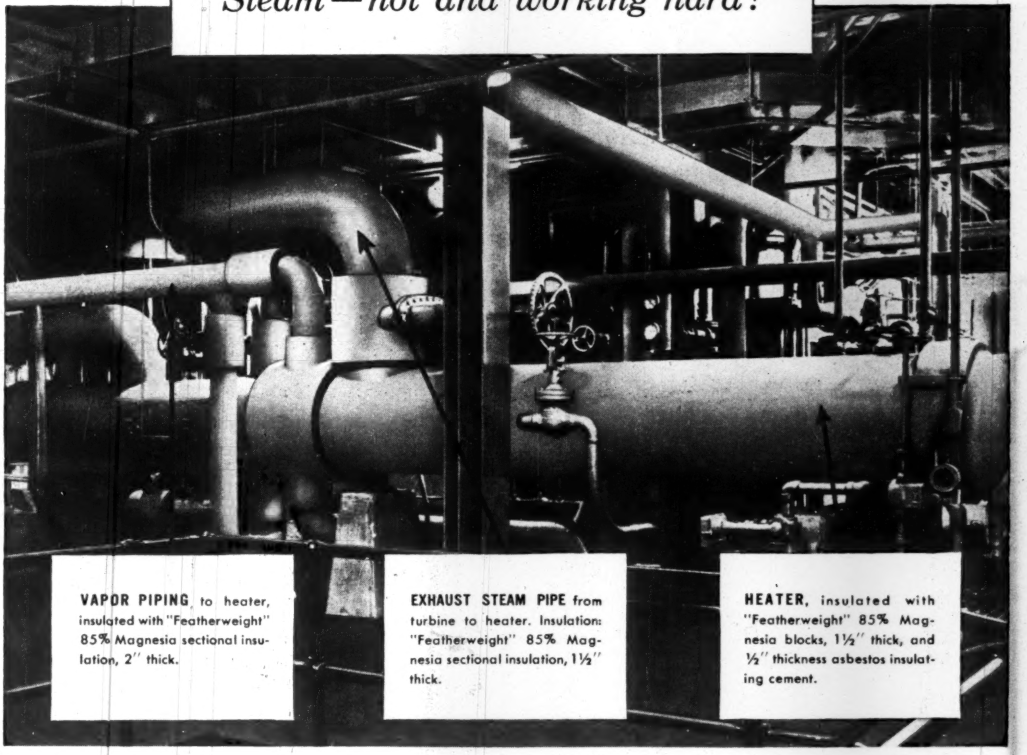


HPAC 39—"Kooler-aire" packaged air conditioning unit in new DRK models featuring two complete refrigeration circuits — United States Air Conditioning Corp., 3300 Como Ave., S.E., Minneapolis 14. The new units have been designed for operation at either full or half capacity, and the separate refrigeration circuits are arranged to provide effective dehumidification at the reduced capacity, the manufacturer states. Internal wiring provides for alternating of the lead compressor, and a time delay relay prevents simultaneous starting of the compressors. The units, which contain all the elements of a central station plant (including the evaporative condenser) are being offered in six sizes ranging in capacity from 15 to 50 tons.

Diaphragm Switch

HPAC 40—The L-38 low pressure diaphragm switch containing a normally open or normally closed switch

Steam—hot and working hard!



VAPOR PIPING to heater, insulated with "Featherweight" 85% Magnesia sectional insulation, 2″ thick.

EXHAUST STEAM PIPE from turbine to heater. Insulation: "Featherweight" 85% Magnesia sectional insulation, 1½″ thick.

HEATER, insulated with "Featherweight" 85% Magnesia blocks, 1½″ thick, and ½″ thickness asbestos insulating cement.

These Keasbey & Mattison Insulations keep heat on the job—keep heating costs down!

Steam is expensive to produce . . . and far too valuable to waste. That's why "Featherweight"® 85% Magnesia was the insulation used in this large Southwestern utility plant.

"Featherweight" 85% Magnesia gives maximum protection against heat loss—keeps steam "on the job" wherever and whenever it's wanted!

This is but one of thousands of installations of "Featherweight" 85% Magnesia Insulation—on ships, in power plants, in the chemical process and food industries. With a background of more than 60 years' service, "Featherweight" is today one of the most widely used and favorably accepted insulations for temperatures up to 600° F. When used in combination with K&M Hy-Temp Insulation, "Featherweight" 85% Magnesia is efficient and practical for temperatures up to 1900° F.

Ask your distributor, who is also an experienced applicator, for complete information on "Featherweight" 85% Magnesia, or any insulations in the complete K&M line. Or, write us.

The newest development in thermal insulation: "KaytherM" High Temperature Blocks

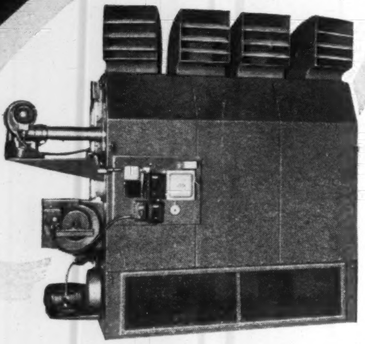
A product of years of research and development! "KaytherM" provides maximum efficiency up to 1500° F. It is molded to size . . . incombustible . . . insoluble in water . . . has exceptional strength and high dimensional stability . . . is light in weight . . . easy to handle . . . quickly applied. Available in flat blocks 6″ x 36″; in thicknesses of 1″, 1½″, and 2″.

KEASBEY & MATTISON
COMPANY · AMBLER · PENNSYLVANIA

Nature made Asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

AIRTHERM
DIRECT FIRED HEATERS
Heat or Ventilate

Installation Requires Less Steel
Than Other Type Heating Systems
...Insure Customer Satisfaction



The Airtherm Space Heater has been designed with extreme flexibility for heating as well as ventilating steel plants, foundries, all types of industrial buildings and warehouses. They are quick, easy, and less costly to install and require less duct work and scarce materials. They are furnished complete with all operating and safety controls for automatic operation. Airtherm Space Heaters have a heavy duty steel combustion chamber lined with castable refractory for simple maintenance and long life.

AVAILABLE IN 9 MODELS — Oil* or gas fired — ranging from 650,000 to 2,000,000 B.T.U. per hour output, in floor mounted or suspended types. Write for Bulletin 802A for complete information.

SEE OUR CATALOG IN SWEET'S

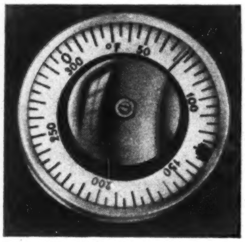
AIRTHERM MANUFACTURING CO.
711 South Spring Avenue
St. Louis 10, Missouri

*Approved by Underwriters' Laboratories

For Complete Customer Satisfaction...
Think First of AIRTHERM

actuated by gas pressure and applicable to heating plant installations—General Controls Co., 801 Allen Ave., Glendale 1, Calif. Pressure applied against a spring loaded diaphragm operates to tilt a mercury tube switch. The diaphragm is made of material impervious to all types of gases, including liquefied petroleum gas, the manufacturer states. The switch is suitable for air or gas applications only, at rated pressures. The operating point is adjustable over a pressure range of 3 to 12 in. of water and operates from a pressure differential of 2 to 4 in. of water.

Switch



Thermometer

Surface Temperature Thermometer

HPAC 41—Thermometer for checking external temperature of pipes, motors, freezers, walls, ceilings, etc.—Pacific Transducer Co., 11921 W. Pico Blvd., Los Angeles 64. It is affixed to flat surfaces by application of a small amount of non-melting silicone grease which holds the instrument throughout all ranges of temperature, the manufacturer states. Also furnished is a small magnetic clamp which holds the thermometer to ferrous surfaces. Temperature is indicated from the back of the instrument only. The range is 0 to 300 F, calibrated in 2 deg increments.

Storage Tank Preheater

HPAC 42—New Model "Hot-Spot" preheater (for oil and other liquids) for 14½ in. manholes of bulk storage tanks — Rempe Co., 340 N. Sacramento Blvd., Chicago 12. It is an all steel shell and coil assembly that rests on the bottom of the tank. Suction pipe and inlet and outlet pipes for heat (either steam or hot water) go through the manhole cover. A flow accumulator causes the liquids to flow over heated pipes before they enter the suction line.

Sound Muffler for Room Air Conditioners

HPAC 43—Sound muffler for room air conditioning units, consisting of a chamber placed in front of the fan mechanism—Mitchell Mfg. Co., 2535 N. Clybourn Ave., Chicago—The air, which is primarily responsible for noise, is routed through the chamber, where it is forced against a special material which deflects it into the room, at the same time absorbing the sound waves. The muffler will be a feature of the company's 1952 room air conditioners.

Motor Starter with Indicating Light

HPAC 44—NEMA size 0 and 1 manual motor starters with built in indicating lights for showing whether starter is on or off — Westinghouse Electric Corp., Box 2099, Pittsburgh 30. The light can be wired into the circuit to

0
1
2
3
4
0
1000
2000
3000
BLAW-KNOX CO.

BLAW-KNOX PIPE HANGERS

MAKE YOUR PIPING LAYOUTS FIT THE JOB

They're engineered to solve the problems of load carrying . . . vibration . . . misalignment . . . flection . . . expansion and contraction.

Whether you are working with high pressures, normal atmospheres or vacuum, Power Piping offers you engineering advice and installation specialties that assure (1) Joints located in zone of lowest bending movement (2) Reduction in number of joints (3) More desirable flow characteristics (4) Savings in linear feet of pipe (5) Better force and stress relationship . . . in other words, simplified, more efficient piping.

POWER PIPING DIVISION
BLAW-KNOX CONSTRUCTION CO.
PITTSBURGH 33, PA.

BLAW-KNOX
ADJUSTABLE PIPE HANGERS
VIBRATION ELIMINATORS
AND SUPPORTS
POWER PIPING DIVISION OF BLAW-KNOX CONSTRUCTION COMPANY
PITTSBURGH 33, PENNSYLVANIA

CATALOG NO. 51. *Blaw-Knox Adjustable Pipe Hangers, Vibration Eliminators and Supports was prepared for Heating, Piping and Air Conditioning Engineers exclusively. Technical data and tables will speed your designs and specifications. Please request copy on letterhead.*

BLAW-KNOX

Pioneers in the Development of
FUNCTIONAL HANGERS
VIBRATION ELIMINATORS

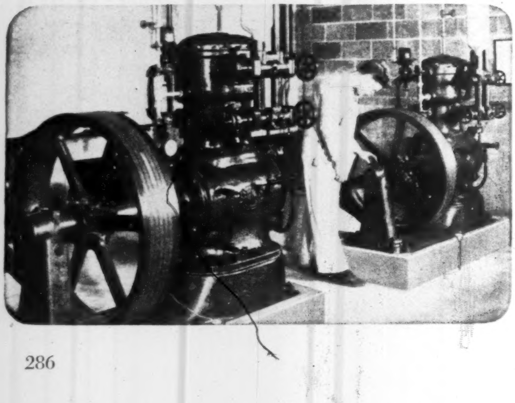
FRUIT STORAGE STOPS SHRINKAGE with NEW FRICK REFRIGERATING SYSTEM

Gillan Brothers maintain relative humidities of 85 per cent or higher in their 40,000-bushel apple storage at St. Thomas, Penna., even with temperatures of 32-33 deg. F! These high humidities keep the moisture where it is wanted—in the fruit.

This remarkable cooling system is equally desirable for storing vegetables, nuts, hides, textiles, and other products. Covered by patent applications, the new Frick system is revolutionizing cold storage practice. Let us show you how it can save your products—and your profits.

DEPENDABLE REFRIGERATION SINCE 1882
FRICK Co.
WAYNESBORO, PENNA. U.S.A.

Below: Two Frick Ammonia Compressors Used for Cooling Gillan Brothers' Apple Storage.



indicate other conditions. It is provided for a-c voltages of from 110 to 600 volts. The starters are mounted in NEMA type I enclosures, and designated as class 10-100-S1 and 10-100S0A.

Splashproof Motors

HPAC 45—Splashproof motors with new device designed to prevent water from high pressure hoses from entering the windings — Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30. The device resembles miniature vee shaped eaves fastened to the inside of the cover above the shaft. A flinger, which is a rubber ring mounted on the shaft, first meets the incoming water and throws it outward. What water goes upward is caught by these inside-out eaves and is drained down the inside of the cover to the bottom outlet.

EQUIPMENT BRIEFS

"Whitex Smooth" *PENCIL CLOTH*, for draftsmen, offered with a liquid eradicator designed to remove pencil areas without disturbing the tooth of the cloth — The Frederick Post Co., 3650 N. Avondale Ave., Chicago 18. The cloth is said by the manufacturer to provide, by its translucency, a maximum contrast between pencil and background.

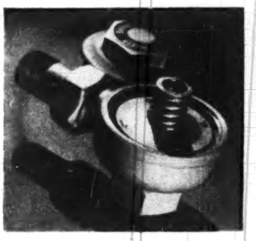
"Longlift" 6 lb *WINCH HOIST ACCESSORY* designed for lifting pipes, motors, ducting, heaters, etc. to ceilings or construction locations as high as 30 ft — Lug-All Co., 331 E. Lancaster Ave., Wynnewood, Pa. Operation is normally from the ground, but the accessory is taken up a ladder for overhead suspension. Capacity is 750 lb.

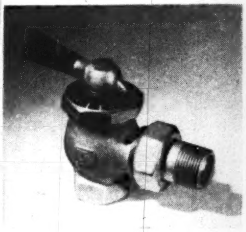
Model Z-1326-10 "Perfect Seal" *FLOOR LEVEL CLEANOUT* designed to provide easy access to drainage lines located in heavy traffic areas—J. A. Zurn Mfg. Co., Erie, Pa. The plug forms a gastight and watertight seal, and its threads will not freeze to the body, permitting the pipe to contract or expand, or the surfacing material encasing the housing to settle, without damage to cleanout or pipe, the manufacturer states.

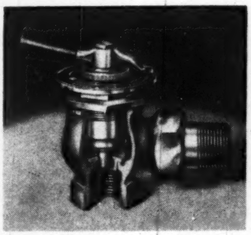
Cat. 120 *ELECTRONIC DIFFERENTIAL PRESSURE INDICATING CONTROL UNIT* for differential pressure between a volume of corrosive gas and a surrounding gas — The Henry G. Dietz Co., 12-16 Astoria Blvd., Long Island City 2, N. Y. The sensing element notes a signal according to the variation in the differential pressure which produces a visual indication on the indicating control unit. This unit is a two position controller which will close a set of contacts when the differential pressure drops below a predetermined value.

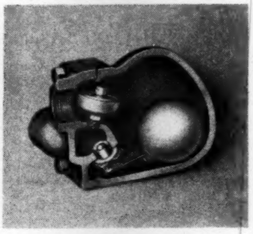
COLLAR EDGING ROLLS for preparing a round sheet metal pipe for joining with a flat sheet—Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11. The contour of the rolls raises a bead above the surface of the pipe, and crimps the edge so that it is smaller than the pipe diameter. The crimped side of the bead is flat, providing a seat for the sheet. It can be peened over to form a tight joint. Rolls are available for use with a rotary and an electric combination machine.

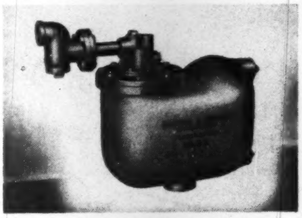
You Can Bank on Long Life and Steady Service with **Barnes & Jones** Steam Specialties


THERMOSTATIC TRAPS


MODULATION VALVES


ORIFICE VALVES


F & T TRAPS


BOILER RETURN TRAPS

Not just one in each lot, but every B & J Thermostatic Trap, Valve and Condensator is fully checked and tested under real operating conditions before it leaves our plant. These tests are far more severe than will ever be encountered in actual service, to assure long life and trouble-free operation.

Does it cost us more to exercise this painstaking attention on quality and detail? Certainly. But Barnes & Jones has never been known to cut corners on its product.

When it comes to steam specialties, it will pay you well to follow the lead of the top-drawer architects and engineers who have made the B & J trademark a quality *buy*-word for more than a quarter of a century.

RADIATOR VALVES
Series F Quick Opening Type
Series K Modulating Type
Series H Adjustable Orifice

THERMOSTATIC RADIATOR TRAPS
Low, Medium and High Pressure, all sizes.

FLOAT & THERMOSTATIC TRAPS
Low Pressure & Medium Pressure.

BOILER RETURN TRAPS (Condensators)
Up to 6,000 square foot capacity.

Barnes & Jones
INCORPORATED
128 Brookside Avenue, Boston 30, Massachusetts
Representatives in all principal cities

WE HEAR THAT . . .

BALTIMORE AIRCOIL CO., INC., has signed a long term lease on a new plant at 2615-35 Mathews St., Baltimore 18, to which the company's plants and offices will be moved about Feb. 1. The plant offers 40,000 sq ft of floor space and a three car railroad siding.

The firm name of the Penn Electric Switch Co., Goshen, Ind., has been officially changed to *PENN CONTROLS, INC.*, to better represent the product line, which has grown to include many items other than electric switches.

The Babcock & Wilcox Tube Co., Beaver Falls, Pa., a wholly owned subsidiary of *THE BABCOCK & WILCOX CO.*, has been dissolved, and is being operated as the Tubular Products Division of the company. The transfer of the plants and business of the subsidiary will have no effect upon its continued operation so far as customers and employees are concerned, and will not change stockholders' equities. *LUKE E. SAWYER* and *EDWARD A. LIVINGSTONE*, officers of the former subsidiary, will also become officers of the company.

HAJOCA CORP., Philadelphia, distributor of heating and plumbing equipment and industrial supplies, is carrying out a program of branch expansion and modernization in 30 cities along the Atlantic seaboard. There is a new branch at Augusta, Ga., and a new branch building in Asheville, N. C. In addition, new showrooms have been opened in Germantown, Lansdale, Bethlehem, and Reading, Pa., Charlotte, N. C., Norfolk, Va., and Chattanooga, Tenn.

The *AMERICAN AIR FILTER OF CANADA, LTD.*, Montreal, has been formed to handle the Canadian business of American Air Filter Co., Inc., Louisville. *WILLIAM G. HOLE*, formerly of Darling Bros., Ltd., will be in charge of all Canadian operations.

A proposed simplified practice recommendation for the packaging of standard malleable iron screwed pipe fittings, black or galvanized, 150 lb steam working pressure for 2 in. pipe size and under, has been submitted to the manufacturers, distributors, users, and others interested, for acceptance or comment, by the Commodity Standards Div., Office of Industry and Commerce, *U.S. DEPT. OF COMMERCE.* The purpose is to establish a simplified schedule of standard quantities per unit package for the pipe fittings referred to above (including such items as elbows, tees, unions, etc.). Copies may be obtained from the division at Washington 25, D.C.

Defense mobilizer *CHARLES E. WILSON*, at a recent industrial celebration, gave the signal to release the first official heat of 250 tons of steel from the first of 11 giant open hearth steel furnaces being built at the Pittsburgh Works of *JONES & LAUGHLIN STEEL CORP.* The furnaces, built at a cost of $70,000,000, are expected to be in full production (2,000,000 tons of steel annually) by March.

Reserve your space now for
The Greatest Show on Earth for the entire oil-heat industry

**29th ANNIVERSARY
OIL-HEAT EXPOSITION**

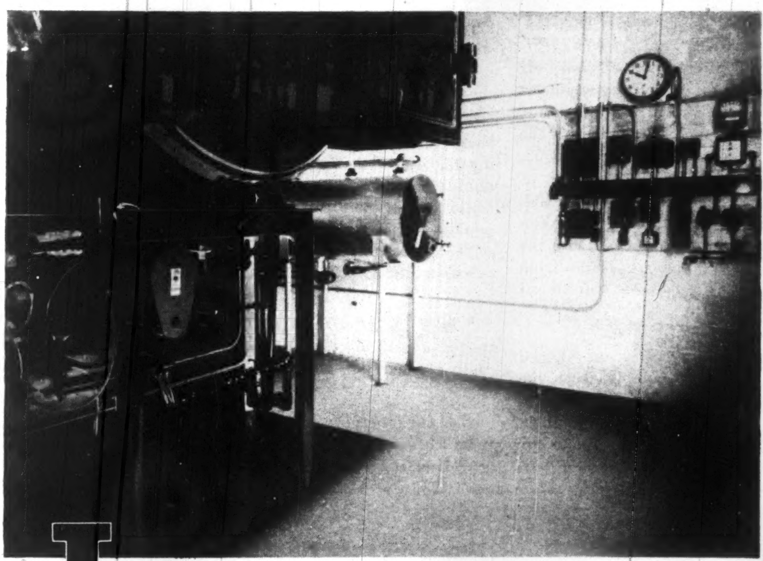
April 14 through 18, 1952 — Commercial Museum, Philadelphia, Pa.

Space is going, going, going—*fast*—for the 29th Anniversary Oil-Heat Exposition, April 14 through 18, 1952. It's *two* big shows (1952 and 1953) rolled into one! Don't miss this chance to present your product to an expected 7,000 equipment and fuel oil dealers and 25,000 consumer prospects!

WRITE • PHONE • WIRE for your
Space Reservation NOW! Sponsored by:
The Oil-Heat Institute of America, Inc.
6 E. 39th Street, New York 16, N.Y.
Murray Hill 5-1638

29th Annual OHI Convention

We save $3800 a year with our Iron Fireman Rotary Oil Burner



says Mr. J. Mayberry, vice-president, Quality Mills, Inc. Mount Airy, North Carolina

"Our Iron Fireman Rotary Oil Burner has resulted in $1,800 per year savings in fuel cost over our previous firing method. In addition to this, other boiler room economies amount to approximately $2,000 per year. The efficiency of this unit has enabled us to save a great deal of time on many of our operations calling for quick steam."

Iron Fireman

Horizontal Rotary Oil Burner

The Iron Fireman Horizontal Rotary Oil Burner installed in the Quality Mills boiler is rated at 75 gallons per hour. It burns No. 6 oil and being fully automatic, requires little attention.

fires fuel oil of any weight with complete dependability

The changeable viscosity of heavy oils was heretofore the toughest problem in firing these heat-rich economical fuels. When warm, they flow freely—when cold, they are almost as sluggish as tar. The Oil Volumeter, with which the Iron Fireman burner is equipped, solves this problem of varying viscosities. Adjustable pistons feed a definite *volume* of oil with each stroke, regardless of the physical properties of the oil.

You save two ways. The heavy oils cost you less per gallon, yet you get up to 12% more Btu's than from lighter oils. The Iron Fireman Rotary Oil burner keeps a steady flame even when throttled down to less than 20% of capacity. . . Facilitates quick starting in cold boilers. . . Capacities up to 500 boiler h.p.

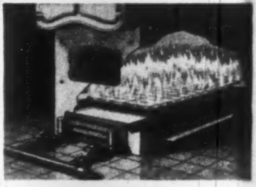
AUTOMATIC FIRING FOR HOMES, BUILDINGS, INDUSTRIAL PLANTS

IRON FIREMAN MANUFACTURING CO., 3271 West 106th St., Cleveland 11, Ohio.

Please send literature as checked:
☐ Rotary Oil Burner
☐ Commercial Gas Burner
☐ Coal-Flow Stoker

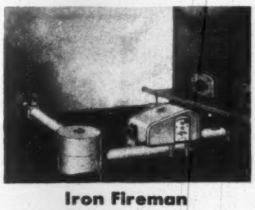
Name ____________________
Address ____________________
City ____________ State ____________

Mail coupon for literature and complete information.



Iron Fireman Commercial Gas Burner

Vertical type has zone control for modulated firing. Other gas-saving models include Radiant Inshot, Ring-Type and combination oil-gas burner.



Iron Fireman Coal-Flow Stoker

Feeds coal direct from bin. No coal handling. Fuel and air supply synchronized for utmost efficiency. Capacities to 500 boiler h.p.

Expansion of the Houston branch of *NATKIN & CO.*, a distributor for *WESTINGHOUSE ELECTRIC CORP.*, has recently been completed. The new building, which houses sales area, offices, shop area and warehouse, occupies 10,000 sq ft of a property consisting of 30,000 sq ft. The remaining space is used for open storage and a rail siding.

A new 8 page booklet, *Research in Air and Water Pollution*, describes the work and facilities of the air and water pollution research section of the Research Division, *COLLEGE OF ENGINEERING, NEW YORK UNIVERSITY*. It contains photos showing wind tunnel tests, air sampling, etc., and covers such topics as sanitary engineering, industrial waste utilization, effects of pollution, etc. It is available free of charge from Vern W. Palen, at the college's Bureau of Public Information, New York 53.

ELLIOTT CO., Jeannette, Pa., recently marked its 50th year at a special meeting of the company's Veterans Association, with nearly 300 veterans, who have been with the company from 20 to 50 years, taking part. Episodes from the company's early history were dramatized, and an oil painting of the founder was unveiled.

A new plant, built to house its recently established Appliance Controls Division, has been completed on the property of *GENERAL CONTROLS CO.* The plant, which covers 15,000 sq ft of working space, has enabled the company to move the division from Monrovia to the main headquarters in Glendale.

A contract to manufacture breech rings for the U.S. Army 90 mm guns, valued in excess of $1,000,000, has been awarded to *YORK CORP.*, York, Pa.

The 20,000 sq ft addition to the *C. A. DUNHAM CO.* Marshalltown, Ia., plant, now under construction, is expected to increase the factory's production up to 25%. Though it was first intended as additional warehouse and storage space only, company officials now have decided that a complete reorganization of the factory's working arrangement is made possible by the new, one-story structure.

The exhibit of the *HENRY VALVE CO.*, Melrose Park, Ill., at the recent 7th All-Industries Exposition Show, Navy Pier, Chicago, incorporated an operating exhibit illustrating the use of the company's 3-way valve hooked up in a dual relief valve assembly. Using a push button, the visitor could control the direction of flow and see how this type of hookup permits a section of the assembly to be cut out, at the same time affording relief valve protection to the refrigerating system.

NORMAN PRODUCTS CO., Columbus, Ohio, has acquired a new machine tool and die plant adjacent to its main plant. It provides 10,000 sq ft of floor space.

BALDWIN-HILL CO., Trenton, N. J., has purchased from the Eagle-Picher Co. the Rockdale Insulation Plant near Housatonic, Mass.

Refinite serves the World

WITH WATER CONDITIONING
EQUIPMENT & SERVICE

Refinite OMAHA, NEB.

WATER REFINING EQUIPMENT

Write for FREE Bulletins On How Refinite
Can Serve You. Address: Dept. HPA

Mr. Heating Contractor:

5 Good "tips" on choosing Eclipse

Mc Kee
Eclipse
HIGH PRESSURE STEAM BOILERS

1

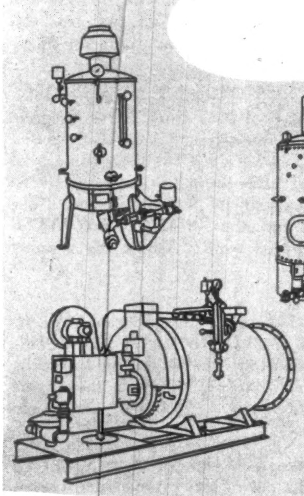
RIGHT POLICY

Eclipse wants to do business with Heating Contractors, and makes it profitable for YOU.

2

RIGHT PRODUCT

Eclipse has a Complete Line of Boilers, ½ to 100 H.P.; Pressure 15 to 250 Lbs.; Gas-Fired, Oil-Fired or Combination Gas and Oil-Fired; Vertical or Horizontal. McKee-Eclipse "Steamboiler plants" are built better than code; easily installed—and Eclipse stands back of the entire installation.



3

RIGHT REPRESENTATION

Eclipse has Representatives in all principal cities, to help you sell and service.

4

RIGHT REPUTATION

Eclipse has been the leader in its field for more than Forty Years.

5

RIGHT FACILITIES

Eclipse has just moved into its brand new modern building, tripling its former floor space. This gives us greatly increased capacity and facilities for Engineering, Building and Delivering still Better Boilers.

The Most Complete Line of Gas-Fired Industrial Equipment on the Market

Eclipse Fuel Engineering Company
1139 Buchanan Street, Rockford, Illinois

McKee Eclipse

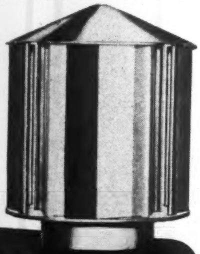
5809

When you consider VENTILATORS

Ask for PROOF

OF PERFORMANCE!

Claims are a dime a dozen in the ventilating field. The only way to be *sure* of what you're buying in *any* make of ventilator is to insist on certified capacity ratings derived from tests made with the wind blowing against the ventilator in *all* directions as shown below. True performance under actual operating conditions can be determined only by such tests!



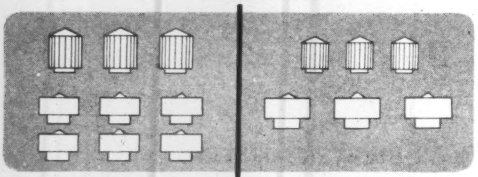
Patent No. 2269428

Breidert Air-X-Hausters

give you CERTIFIED and Published Capacity Ratings

Breidert ratings *are* based on tests made with wind blowing in all directions.* No matter which way the wind blows, barring interior negative pressures, the Breidert provides safe, sure ventilation . . . on roofs, vent flues, chimney tops. Stationary, no moving parts, nothing to jam or get out of order

HOW YOU CAN GET BETTER RESULTS WITH LESS MONEY



It takes fewer Breiderts to do the job as same size conventional ventilators. **(or)** *You can use the same number of smaller size Breiderts to do the same job as conventional ventilators.*

Get *all* the facts! Write today for complete Engineering Data Book, including certified capacity ratings. Address Dept. A.

**By Pittsburgh Testing Laboratories*

THE G. C. BREIDERT CO.

3129 San Fernando Road, Los Angeles 65, Calif.

Representatives in principal cities throughout the U.S.

At the recent 72nd annual meeting of the *AMERICAN SOCIETY OF MECHANICAL ENGINEERS, WILLIAM L. BATT*, minister in charge of the Economic Cooperation Administration mission to the United Kingdom, was awarded the Hoover Medal; *ERVIN G. BAILEY*, vice president, Babcock and Wilcox Co., received the John Fritz Medal, and *THOMAS ROY JONES*, president, Daystrom, Inc., received the Henry Laurence Gantt Medal.

The annual week long sales conference of *BRUNNER MFG. CO.* representatives was held at company headquarters, Utica, recently. During the opening session, *A. G. ZUMBRUN, SR.*, president, reviewed the financial report showing sales at an all time high.

To meet the increased need for mathematical methods in the field of heat engineering, a consulting group, *MATHEMATICAL COMPUTING SERVICE*, 105 Court St., Brooklyn 2, has been formed. It specializes in aiding industries and universities desiring complex engineering calculations, providing mathematical formulations and solutions of problems from the given physical data. The staff consists of consultants holding doctorate degrees, who are qualified to treat problems in applied mathematics related to heat conduction, radiation, thermodynamics, etc.

At a recent ceremony, the first aluminum was poured at the Chalmette plant (New Orleans) of *KAISER ALUMINUM & CHEMICAL CORP.* This is the first new primary aluminum plant to be brought into production under the nation's expansion program for the industry.

EDWIN L. MARSHALL of New York University, and *STAN SPAULDING*, Purdue University, have been selected by the *AMERICAN WELDING SOCIETY* as winners of the $200 first prize and $150 second prize, respectively, in the 1951 Davis Undergraduate Welding Award. The *NYU QUADRANGLE* and the *PURDUE ENGINEER* were awarded similar prizes for publishing the winning papers.

DETROIT LUBRICATOR CO., subsidiary of *AMERICAN RADIATOR AND STANDARD SANITARY CORP.*, has purchased a 75 acre factory site in Sterling Township, Macomb County, Mich., which will permit the expansion of the company's facilities.

The refrigerant hose assemblies of *RESISTOFLEX CORP.*, Belleville, N. J., have been listed under Underwriters' Laboratories' reexamination service. Tests showed the suitability of the lines for use with Group 1 refrigerants, carbon dioxide excepted. The assemblies will, therefore, carry approval for factory installations in self-contained refrigeration systems containing not more than 20 lb of a Group 1 refrigerant.

Recent ceremonies, attended by the mayor and other local and state officials, marked the opening of a new *KRESNO-STAMM MFG. CO.* factory (16,000 sq ft) at Palisades Park, N. J. The company also has a plant in Canada.

THERE'S NO PLACE FOR THESE TROUBLEMAKERS • •

MAINTENANCE
POOR REGULATION
REPLACEMENTS
SPOILAGE
STOPPAGES
FAILURES

IN PLANTS THAT CAN MAKE A STATEMENT LIKE THIS • •

"We use your Streamlined '1000' Valves on the following equipment:

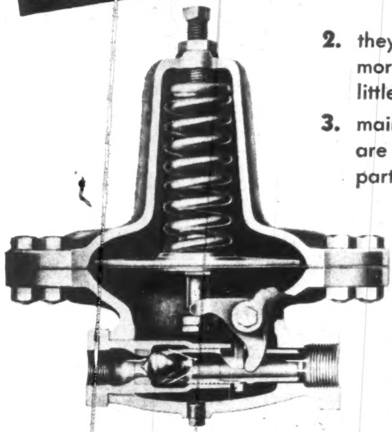
- Heating Systems
- Solution Heaters
- Plating Tanks
- Degreasing Machines
- Hot Water Heaters

CASH STANDARD TYPE 1000 *Streamlined* PRESSURE **REDUCING VALVE**

"We use them:

1. because they hold close delivery pressure control.
2. they don't get gummed up, so we get more and better production with very little lost time.
3. maintenance cost is very low—the guts are cheap—old parts come out and new parts go in easily with little time lost."

•



ITS ASPIRATOR AND STREAMLINED FLOW WORK TO YOUR BENEFIT IN THESE 12 WAYS . . .

1. Maximum Capacity when needed most. 2. Accurate Pressure Control under toughest working conditions. 3. Trouble-free Service. 4. Smooth Operation. 5. Tight Closure. 6. Accurate Regulation. 7. Speedier Production Results. 8. Elimination of Failures. 9. Constant Delivery Pressure. 10. Cost Saving Operation. 11. No Spoilage. 12. Practically zero in maintenance costs.

CASH STANDARD
CONTROLS...
VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

•

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

Send for them

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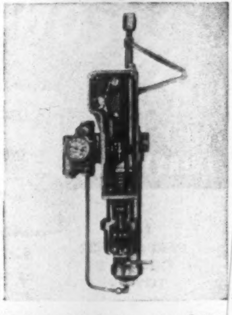
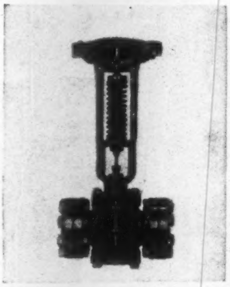
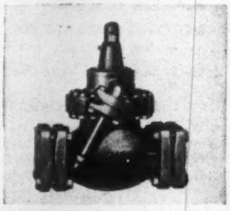


Bulletin 963 features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers — various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.



Bulletin 968 features the CASH STANDARD Type 34 Pressure Reducing Valve — direct operated — direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.



Bulletin 956 features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

IN STOCK for Your Convenience

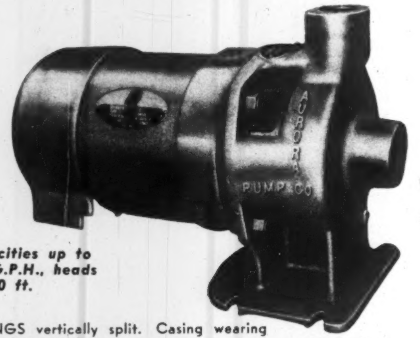
AURORA
CLOSE-COUPLED
Package
AIR CONDITIONING PUMPS

They have EVERYTHING!

☑ LOW COST
☑ LONG LIVED
☑ SMOOTH, QUIET
☑ MECHANICAL SEAL
☑ DEPENDABLE
☑ DISASSEMBLY is QUICK and SIMPLE*

for
EVAPORATOR COOLING TOWERS
•
AIR CONDITIONING UNITS
•
also for GENERAL SERVICE

Air conditioning contractors as well as manufacturers of air conditioning equipment will welcome these notable close-coupled package pumps. Mechanical seal requires no packing or maintenance. *Pump may be disassembled without disturbing discharge connections or hold down bolts. Sturdy, lasting and efficient.



Capacities up to 150 G.P.H., heads to 100 ft.

Aurora Type JMC Pump — Close-Coupled

CASINGS vertically split. Casing wearing ring standard.

MECHANICAL SEAL is standard on all sizes and located in packing cover.

IMPELLER is balanced, of enclosed type, high grade bronze.

MOTOR — NEMA specifications, Stainless Steel Shaft on JMC — for all circuits and various enclosures.

BALL BEARINGS — on JMC built into motor.

OTHER AURORA AIR CONDITIONING UNITS

We are also in a position to supply various sizes of air conditioning pumps in V-Belt drive, and flexible coupling drive. Our large type G.M.C. Close-Coupled Pumps can be furnished up to 800 G.P.M. and heads to 200 ft.

Complete Information on Request
DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS
AURORA PUMP COMPANY
80 Loucks St., Aurora, Illinois

WHO'S WHAT

FRANK S. WARD, since 1945 industrial sales manager, is now general sales manager for *TAYLOR INSTRUMENT COMPANIES*, Rochester. He replaces *RAYMOND E. OLSON*, recently elected company president. Succeeding Mr. Ward is *ALBERT J. FLEIG*, who, since 1945, has been divisional manager in charge of sales to the chemical, petroleum and canning industries. *GEORGE E. HELLER*, with the firm since 1935, has been named manager of a new industrial sales division handling products sold to the chemical industry, and *RICHARD N. POND*, who started with the company in 1941, is now a divisional manager handling petroleum and canning industry sales.

At the recent meeting of the board of directors of the *AIR CONDITIONING AND REFRIGERATING MACHINERY ASSOCIATION*, *J. F. KNOFF*, general sales manager, Airtemp Div., Chrysler Corp., and *M. E. MOONEY*, vice president, Baker Refrigeration Corp., were elected to board membership. *A. P. SHANKLIN*, vice president, Carrier Corp., and chairman of *ACRMA's* executive committee, was elected president for the balance of the association year, replacing *FRED W. SMITH* who has retired from industry activities. *GEORGE E. WALLIS*, president, The Creamery Package Mfg. Co., was elected vice president, succeeding *C. S. STACKPOLE*.

LORING T. CRAMER is the new chief, Petroleum Branch, Transportation, Public Utilities and Fuels Div., *OFFICE OF PRICE STABILIZATION*. He spent 35 years in the marketing division of Continental Oil Co., Ponca City, Okla., retiring as assistant general sales manager in June, 1951, and serving as senior consultant for the firm since that time. He replaces *O. D. JUDD*, who left OPS to accept a position with Sinclair Refining Co.

PAUL F. NEESS, sales engineering department manager of the controls division of *PERFEX CORP.*, Milwaukee, has been assigned the staff position of product manager for gas controls. He will have responsibility for product and market development of these controls. *ROBERT H. PRATT*, formerly manager of appliance and accessory control sales, has been appointed product manager for oil and electric appliances for the controls division.

PHILIP RYAN, vice president in charge of manufacturing for *CUTLER-HAMMER, INC.*, Milwaukee, has been appointed to the additional post of executive vice president. *R. A. MILLERMASTER*, assistant manager of the development department for the past five years, has been appointed manager of that department. *C. W. KUHN*, also assistant manager of the development department since 1946, is now director of development engineering.

WILLIAM B. COOPER has been appointed to the newly created position of sales manager of engineered products for *AMERICAN RADIATOR & STANDARD SANITARY CORP.*, Pittsburgh. His department will handle the sale of air conditioning, cooling, and specialized heating equip-

SEND FOR THE NEW P K 40 PAGE WATER HEATER CATALOG

Patterson
Patterson-Kelley Co.

p-k catalog No. 202 provides you
with a simple, rapid means of selecting the
correct hot water heater for forced circulation.
Capacities from 95 to 101,000 gph.
Steam pressures range from 0 to 100 psig.
Standard "U" Tube Heaters are available
in 2- 4- or 6-pass construction.
Water temperatures range from 40° to 100°F. inlet
and 80° to 300°F. outlet.

1035

other TAB INDEX FEATURES

- **Condensate Cooler tables**
- **Dishwater Booster Heater tables**
- **Gravity circulation tables**
- **Hot Water Service Heater tables**
- **Pressure drop tables**
- **Typical piping arrangement**

the P K please send **p-k** catalog 202

Patterson-Kelley Co., INC.

89 BURSON ST., EAST STROUDSBURG, PENNA.

Name Position

Company

Street City State

ment. *FRANK E. HANSON*, formerly chief engineer of the company's gas department, has been named products engineer and will supervise all field research in the development of new products. He is succeeded in his former post by *JOHN B. UHL*, formerly his assistant.

MINNEAPOLIS-HONEYWELL REGULATOR CO., Minneapolis, has elected *GERRY E. MORSE* as vice president in charge of industrial relations. He has been with Sylvania Electric Products, Inc., since 1933, most recently as director of employee relations.

The new acting director, Product Development Dept., Glass Div., *PITTSBURGH PLATE GLASS CO.*, Pittsburgh, is *RUSSELL G. WHITTEMORE*. He has been with the company since 1930, during the past eight years as a technical representative of the department.

EARL E. BROWN was named president of the *PLUMBING AND HEATING INDUSTRIES BUREAU* at its recent 32nd annual meeting. *ARNOLD H. GOELZ* was renamed vice president, and a former president, *GEORGE O. TOEPFER*, was chosen treasurer. *NORMAN J. RADDER* was re-elected secretary.

JAMES S. ANDERSON, who has been on leave from *THE BABCOCK & WILCOX TUBE CO.*, Beaver Falls, Pa., has returned to his duties as assistant general sales manager. He had been in Washington serving as chief of the tubing section of the iron and steel division, Industries Operations Bureau, NPA.

The new chief engineer for *UNITED STATES AIR CONDITIONING CORP.*, Minneapolis, is *A. J. MALLINCKRODT*. He was formerly manager of engineering for Baker Refrigeration Corp.

JAMES W. STEWART has been appointed general manager of *THE AJAX CORP. OF AMERICA*, Evansville, Ind. Previously, he had been a company distributor in the New York City area. In addition, *M. FRANZ BREITLING*, formerly a district manager, is now sales manager.

RHEEM MFG. CO., New York, has appointed *WILLIAM S. RHEEM*, who started with the company in 1938, as manager of the South Gate, Calif., plant. *LLOYD SIMONSON*, who has been manager of that plant, has been named manager of the Sparrows Point, Md., plant, and *HARRY H. FILLER*, until recently in charge of the three South American plants, is now managing the Bayonne and Linden, N. J., plants.

WILLIAM R. MEIKLE has been named plant manager of the Middletown, Pa., plant of *THE NATIONAL RADIATOR CO.*, Johnstown, Pa. He recently joined the company to handle heavy steel defense production at this plant.

J. F. KNOFF, who has been assistant general sales manager, was recently named general sales manager, *AIRTEMP DIV., CHRYSLER CORP.*, Dayton. *T. B. HOLLENCAMP*, former supervisor of service, was named national service manager. In addition, *F. J. LAUGHNA*,

for Ducts, Piping and Equipment Handling Air • Flue Gases • Water • Steam

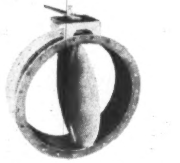
For easy flow control and quick shut-off of low pressure steam, cooling water, draining dehumidifiers, flue gases, air supply and forced draft for combustion equipment, air flow in dust collecting systems, shut-off for ventilating systems, and other warm air and sheet metal applications—

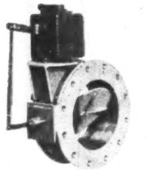
For dependable, trouble-free service install Rockwell Butterfly or Slide Valves. They give full flow area, minimum pressure drop; commercially tight; easy to clean. Pressures to 100 p.s.i. Made of any metal and equipped with hand types or automatic controls. Standard and special types. Sizes—slide valves to 24"; butterfly types—to 72" pipe size and larger.

Write for Rockwell Valve Catalog.

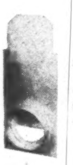
W. S. ROCKWELL COMPANY
254 Eliot Street • Fairfield, Connecticut

W. S. ROCKWELL VALVES
Manual or Automatic

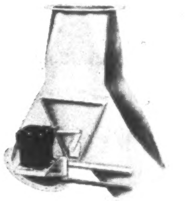

Fabricated steel flanged butterfly valve, 24" pipe size, with lever control, for forced draft air system.


Standard cast iron flanged, butterfly valve with totally enclosed electric motor control.

Small threaded butterfly valve with air diaphragm control unit.

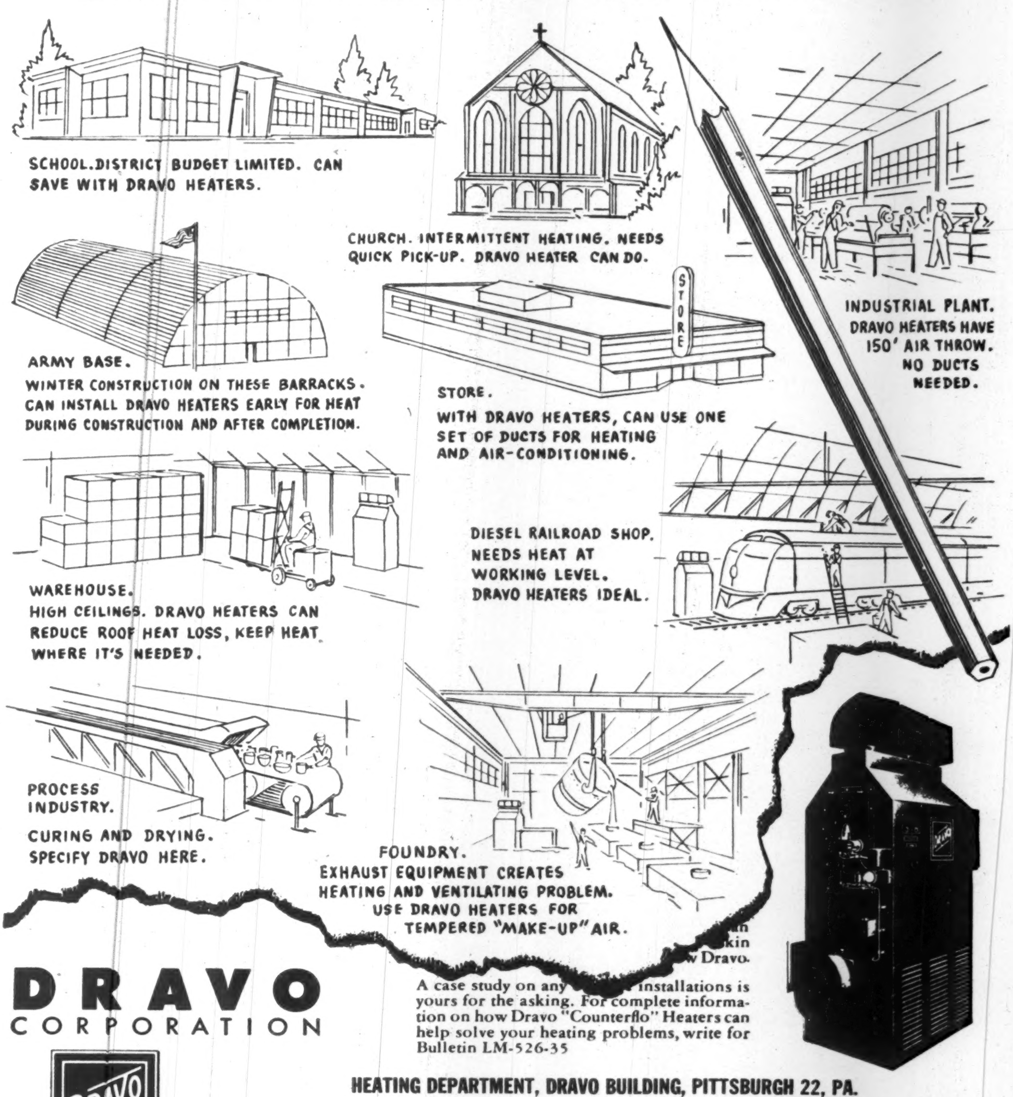

Simple sheet metal slide valve for ventilating and air systems.

Standard slide valve, with pull handle control; sizes in lever and wheel control to 20".


Sheet metal switch gate with removable damper blades, controlled by an electric motor.

NOTES FROM AN ENGINEER'S SKETCH PAD

LOOKS LIKE THAT VERSATILE DRAVO "COUNTERFLO" HEATER CAN BE USED ON PRACTICALLY ALL OUR JOBS.



SCHOOL. DISTRICT BUDGET LIMITED. CAN SAVE WITH DRAVO HEATERS.

CHURCH. INTERMITTENT HEATING. NEEDS QUICK PICK-UP. DRAVO HEATER CAN DO.

INDUSTRIAL PLANT. DRAVO HEATERS HAVE 150' AIR THROW. NO DUCTS NEEDED.

ARMY BASE.
WINTER CONSTRUCTION ON THESE BARRACKS. CAN INSTALL DRAVO HEATERS EARLY FOR HEAT DURING CONSTRUCTION AND AFTER COMPLETION.

STORE.
WITH DRAVO HEATERS, CAN USE ONE SET OF DUCTS FOR HEATING AND AIR-CONDITIONING.

DIESEL RAILROAD SHOP. NEEDS HEAT AT WORKING LEVEL. DRAVO HEATERS IDEAL.

WAREHOUSE.
HIGH CEILINGS. DRAVO HEATERS CAN REDUCE ROOF HEAT LOSS, KEEP HEAT WHERE IT'S NEEDED.

PROCESS INDUSTRY.

CURING AND DRYING. SPECIFY DRAVO HERE.

FOUNDRY.
EXHAUST EQUIPMENT CREATES HEATING AND VENTILATING PROBLEM. USE DRAVO HEATERS FOR TEMPERED "MAKE-UP" AIR.

an
kin
w Dravo.

A case study on any installations is yours for the asking. For complete information on how Dravo "Counterflo" Heaters can help solve your heating problems, write for Bulletin LM-526-35

DRAVO CORPORATION

DRAVO

HEATING DEPARTMENT, DRAVO BUILDING, PITTSBURGH 22, PA.

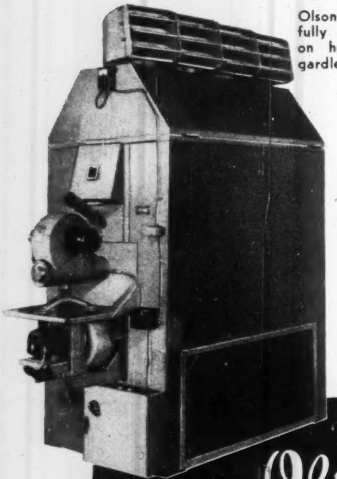
PITTSBURGH • CLEVELAND • PHILADELPHIA • DETROIT • NEW YORK • CHICAGO • ATLANTA • BOSTON

Sales Representatives in Principal Cities. Mfd. and Sold in Canada by Marine Industries, Ltd., Sorel, Quebec

Export Associates: Lynch, Wilde & Co., Washington 9, D. C.

IT'S BETTER ON THE OUTSIDE

ALL OLSON HEATER ACCESSORIES ARE MOUNTED OUTSIDE THE HEATER WHERE THEY CAN BE SERVICED WITHOUT DISMANTLING THE UNIT. A BEARING, FOR EXAMPLE, MAY BE REPLACED IN A FEW MINUTES WITHOUT PROLONGED INTERRUPTION OF HEAT SUPPLY.



Olson Engineers will cheerfully give their assistance on heating problems regardless of size or location.

Olson
ARTHUR A. OLSON & CO.
Gas, Oil, Coal or Dual Gas and Oil
BROAD ST. · CANFIELD, OHIO

Write for complete information and data sheet showing horizontal and inverted models, stoker fired and duct units.

formerly administrative assistant to the vice president, and *M. T. BARD*, formerly director of national account and packaged air conditioning sales, have been appointed assistant sales managers. *S. R. PRUGH*, previously assistant budget director, is now administrative assistant to the general sales manager.

CHARLES SMITH, who joined the company in 1941, has been named manager of the product service division at Chicago, for *A. O. SMITH CORP.*, Milwaukee, succeeding *J. W. SPOOR*, who was named general sales manager of the welding products division. *P. H. FAHRER*, former manager of the Los Angeles product service branch, moves to Chicago as Mr. Smith's assistant. He is succeeded by *GEORGE CARLSON*, formerly with the Union, N. J. branch.

RELIANCE ELECTRIC & ENGINEERING CO., Cleveland, has promoted *JOHN L. FULLER* to the newly created administrative post of manager of research and technical services. He has been technical co-ordinator in the engineering department.

CARSON L. RUYLE has been appointed advertising manager of the *GARDNER-DENVER CO.*, Quincy, Ill., succeeding *DAMON P. TUNNICLIFF*, who has been called to active service in the Navy. Mr. Ruyle has been a member of the sales division in Quincy since 1941.

C. S. STACKPOLE is the new vice president in charge of Williams Oil-O-Matic Div., *EUREKA WILLIAMS CORP.*, Bloomington, Ill. He fills a position vacant since *L. A. CASLER*, executive vice president, was put in charge of defense work and overall production. Formerly, he was vice president and general sales manager, Airtemp Div., Chrysler Corp.

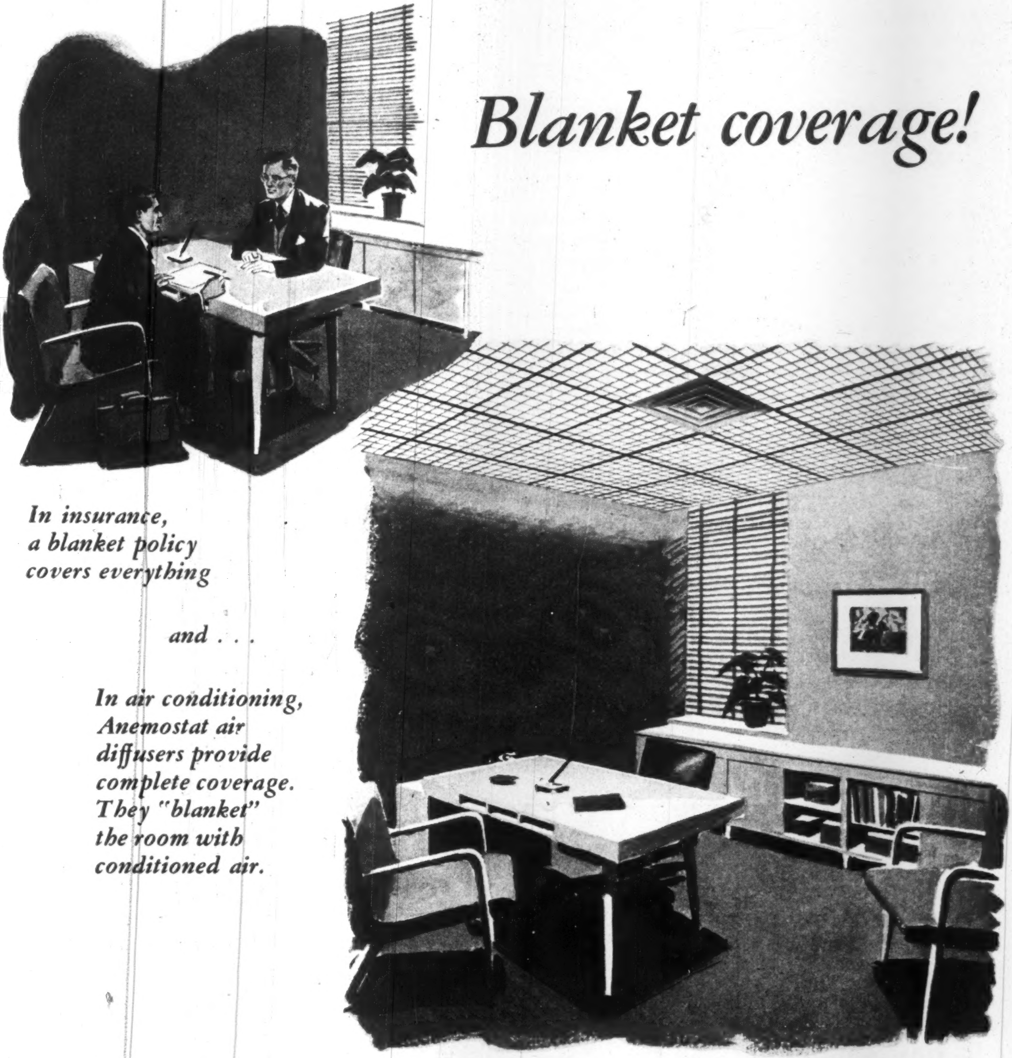
HAROLD E. PARK has been elected vice president of the *SHAW-PERKINS MFG. CO.*, Pittsburgh. His new assignment puts him in executive control of production, engineering and sales.

L. E. OSBORNE, formerly vice president in charge of manufacturing, has been named to the newly created post of executive vice president — defense products, for *WESTINGHOUSE ELECTRIC CORP.*, Pittsburgh. *TOM TURNER*, formerly vice president in charge of labor relations, retains his old post and also succeeds Mr. Osborne, with the title of vice president in charge of manufacturing and labor relations.

H. W. MILNER is the new manager of the special accounts division, *BRYANT HEATER DIV.*, Cleveland. He has been associated with Heating Research Corp., as vice president in charge of sales, and Stewart-Warner Corp., as a sales manager.

FRANK C. HAWK is the new director of sales for *BRUNNER MFG. CO.*, Utica, succeeding *J. W. THOMAS*, now New York district sales manager. Previously, he was with Bush Mfg. Co. *O. ROSS McDONALD*, for the past eleven years advertising and sales promotional manager, has been named to the new post of public relations officer, and *C. M. HATCHER*, formerly with Baker Refrigeration

Blanket coverage!



In insurance,
a blanket policy
covers everything

and . . .

In air conditioning,
Anemostat air
diffusers provide
complete coverage.
They "blanket"
the room with
conditioned air.

These diffusers distribute air in many diverse planes. The unit creates a series of counter currents which siphon room air into the diffuser up to 35% of supply air, depending on type and size of unit. Room and supply air are then mixed within the Anemostat air diffuser before being discharged.

This aspiration results in a uniform "blanket" of *gently moving* air. There is no risk of uncomfortable drafts, no stale air pockets . . . temperature and humidity are equalized. These Anemostat advantages are good "insurance", for they provide true conditioned comfort in your heating, ventilating and air conditioning installations.

AC 1283

ANEMOSTAT®

DRAFTLESS *Aspirating* **AIR DIFFUSERS**

ANEMOSTAT CORPORATION OF AMERICA
10 EAST 39th STREET, NEW YORK 16, N. Y.
REPRESENTATIVES IN PRINCIPAL CITIES

"No Air Conditioning System Is Better Than Its Air Distribution"

Corp., succeeds him in his former post. *WILLIAM STOM*, a member of the engineering staff for several years, has been appointed to the post of chief application engineer.

W. J. RASHLEIGH, formerly central division manager for Sylvania Electric Products, Inc., has joined *UNISTRUT PRODUCTS CO.*, Chicago, where he will serve in an executive sales capacity.

BARNES MFG. CO., Mansfield, Ohio, has appointed *WILLIAM D. SCHNEIDER* as national manager, pump and water system sales. He has been western regional sales manager.

HARRY S. STOTT is the new general sales manager of both the gasket and packing division, and the fluorocarbon products division, for *THE UNITED STATES GASKET CO.*, Camden, N. J.

E. ROWLAND ENGLISH, formerly with H. C. Price Co., has joined *PIPE PROTECTION SERVICE, INC.*, Elizabeth, N. J., as vice president. He will be in charge of sales. . . . . . *EDWARD B. HOAGLAND* has been appointed credit manager of *MORRISON STEEL PRODUCTS, INC.*, Buffalo.

. . . IN THE TERRITORIES

For *TIMKIN SILENT AUTOMATIC DIV.*, Jackson, Mich.—*FELIX HUBER*, who joined the company as a district sales manager in 1949, is the new regional manager for Iowa, Illinois, Missouri, Nebraska and Kansas. He succeeds *W. J. CHAPPELL*, who now serves as regional manager for Michigan, Ohio, Indiana, Tennessee, Kentucky and West Virginia.

For *BOYLE-MIDWAY, INC.*, New York—*THE SCHWERIN AIR CONDITIONING CORP.*, 570 Lexington Ave., N.Y., has been appointed exclusive wholesale distributor in the New York area for "Renovair" air deodorizer and the equipment used for dispensing it.

For *CONOFLOW CORP.*, Philadelphia—the Chicago representative, *J. R. SIMPSON & CO.*, has appointed a new associate, *J. ROBERT SIMPSON III*, who has been a sales engineer for the corporation for five years.

For *QUAKER RUBBER CORP.*, Philadelphia—two new branch managers. *J. J. MERKEL*, with the company since 1948, will manage the Detroit district, and *E. E. KLEMM*, who joined the company more than three years ago, will manage the Cleveland district.

For *THE KRAMER TRENTON CO.*, Trenton, N.J.—a new sales representative, *ARTHUR A. REED*, for the state of Michigan. He will handle the complete line of heat transfer products. For the last six years, he has been associated with the Clark Bridgman Co., Chicago.

For *MINNEAPOLIS-HONEYWELL REGULATOR CO.*, Minneapolis—*BERT ENGSTROM*, previously with

For DEFENSE AGAINST CORROSION

. . . use

STEDCO FIN-TYPE RADIATION

. . . with Aluminum Fins

Stedco

A NON-CORROSIVE HEATING ELEMENT

STEDCO fins are attached to the tubing in an inter-locking sleeve fashion and completely encase the center tubing. This makes a non-corrosive heating element plus giving a double contact surface area between fin and center tubing resulting in longer life and outstanding high heat capacity. One lineal foot of Stedco radiation with aluminum fins will give 1930 B.T.U. or 8 sq. ft. of E.D.R. per hour. Stedco radiation is also manufactured with steel fins.

Manufacturers of STEDCO Compact Convectors

HIGH HEATING CAPACITY

For Industrial, Commercial and Institutional installations where top performance is demanded!

A STEDCO INSTALLATION

U. S. Veteran's Hospital
Wilkes-Barre, Pa.

Stedco radiation was the choice for this hospital where economical, dependable heating is a prime requisite. Stedco met and passed the rigid specifications and requirements.

Stedco Products
Kingston, Penna.
Wilkes Barre, Penna.

Immediate delivery on Steel and Aluminum Fin Radiation

"Where's our heat **come from** Daddy?"

Steel pipe radiant panels provide "invisible heat"

Parents whose questioning children persistently ask for answers to such stumpers as "What keeps an airplane up?", may sometimes regard the conveniences of modern living as a mixed blessing! For what 6-year-old, snug and comfortable in a radiant-heated home, wouldn't wonder about and ask "where the heat is coming from?"

"Invisible heat" . . . the spring-like warmth from radiant panels concealed in floors, ceilings or walls . . . is here to stay, and its growing popularity will soon make it as understood by our children as was the polished parlor stove by our grandfathers.

Reliable steel pipe, proved in over 60 years of service in hot water and steam heating systems, is, of course, the first choice for these radiant panel heating systems. For it embodies *every* necessary characteristic—economy, formability, and weldability, and, durability that is satisfying beyond the life-span of the structure.

That's why those who design, specify, sell or install steel pipe radiant panel heating and snow melting systems are assured satisfied customers!

Write for a copy. A free 48-page color booklet "Radiant Panel Heating with Steel Pipe"

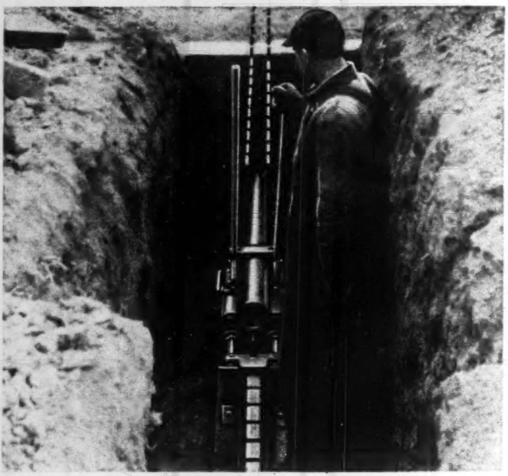
Steel Pipe
is First Choice

COMMITTEE ON STEEL PIPE RESEARCH
AMERICAN IRON AND STEEL INSTITUTE
350 Fifth Avenue, New York 1, N.Y.

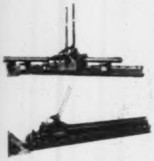
SAVE HOURS, CUT COSTS

ON YOUR PIPING JOBS WITH

GREENLEE PIPE PUSHER



Here's the quick, simple way to install underground pipe. With a GREENLEE Hydraulic Pipe Pusher *one man* pushes pipe *under* streets, walks, tracks, lawns, floors and other obstacles. Cuts job time to a fraction . . . no costly tearing up of paving . . . eliminates extensive ditching, as just a short trench accommodates the Pusher. No tedious tunneling, back-filling, tamping or re-paving. Greatly reduce job time, reduce costs with the GREENLEE which often pays for itself on the first few jobs. Compact, portable, powerful. Get facts today.



Two sizes to fit the exact needs of yours jobs: No. 790, at left, for ¾ to 4-inch pipe. 6,500 to 40,000 lbs. pushing power. No. 795, lower left, for pipe larger than 4-inch, concrete sewer pipe, large drainage ducts. 25,000 to 150,000 lbs. pushing power. Power pump at right for extra ease and speed of operation.

TOOLS FOR CRAFTSMEN

GREENLEE

Greenlee timesaving tools for plumbing and heating work . . . Hydraulic Pipe Benders • Tubing Benders • Hydraulic Pipe Pushers • Pipe Bits • Auger Bits • Spiral Screwdrivers • Chisels and Many More. Write for details. Greenlee Tool Co. 2341 Twelfth Street, Rockford, Illinois.

the Cleveland office, has been named assistant sales manager of the wholesale division, in charge of the territory west of the Mississippi River. His headquarters will be Minneapolis. The company recently opened a new district office at Harrisburg, Pa., located in the Kline Village development. *WILLIAM J. BROSCH* and *JACK CAYLOR* will handle sales in the district for the Brown Instruments division; *JOHN HOPKINS* will handle commercial, and *DONALD SCHMICK*, heating controls division sales. *TAYLOR G. NELSON*, formerly vice president and sales manager of the Titan Valve Co., is the new eastern sales manager for the company's appliance controls division. His headquarters will be the Cleveland office, and he will handle water heater controls and other products (except space heating controls) east of the Mississippi, and in states bordering the river on the west.

For *JANITROL DOMESTIC-COMMERCIAL DIV., SURFACE COMBUSTION CORP.*—*R. B. HOOVER* is the new sales engineer in the northern Indiana territory. His headquarters will be in the district office in Sheridan.

For *GENERAL CONTROLS CO.*, Los Angeles—*JOHN R. FERGUSON*, who formerly managed the Salt Lake City branch office, is the new district manager for the branch office at Denver. *HERB LINDSTROM*, who held that post, is now district manager at the Minneapolis branch.

For *FITZGIBBONS BOILER CO.*, New York—a new representative for the Knoxville, Tenn. area, *JOHN M. DOOLEY*, who was staff engineer for the Knoxville utilities board until he became a manufacturer's representative over a year ago.

For *SPANG-CHALFANT DIV., THE NATIONAL SUPPLY CO.*, Pittsburgh—*DONALD E. DRAPER* has been appointed sales representative in the Pittsburgh district. He has been with the company since 1948.

For *MAID-O'-MIST, INC.*, Chicago—a new representative for central and northern Illinois and Indiana, *ZANIN-O'BRIEN SALES CO.*, Chicago.

For *CONTROLS DIV., PERFEX CORP.*, Milwaukee—*ROBERT E. KURRASCH* has been appointed Chicago district manager to cover Illinois and Iowa. He had been a sales engineer with Unistrut Products Co., Chicago.

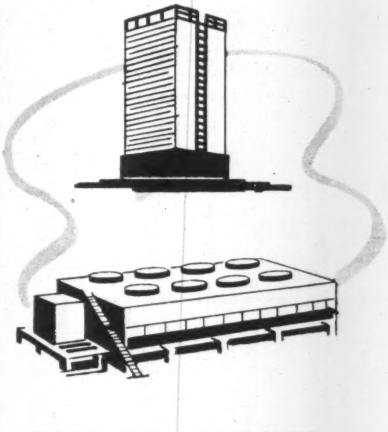
For *WAGNER ELECTRIC CORP.*, St. Louis—*W. H. PREWITT, JR.*, with the company since 1935, is now manager of the electrical division branch office in Atlanta. He succeeds *L. C. BARTON*, who has retired.

For *LYNCH CORP.*, Anderson, Ind., and Toledo, Ohio—a new western division office and warehouse at 221 11th St., San Francisco. It will be managed by *CAL B. PIERCE*, PAR division western district manager. *ART NIELSEN*, of the Anderson plant, will be the new sales engineer.

For *THE EMERSON ELECTRIC MFG. CO.*, St. Louis—a new location, at 1623-25 S. Pulaski Rd., for the Chicago district office. All warehouse and office operations are consolidated in the new and larger quarters.

LILIE-HOFFMANN
Cooling Towers

Quality Unexcelled
in Design,
Construction,
Performance



WRITE FOR LITERATURE . . .
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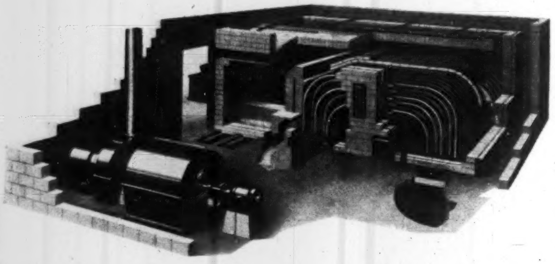
LEE

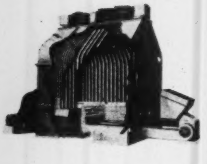
BRICK-SET TUBULAR HEATER



THE BRICK-SET TUBULAR HEATER

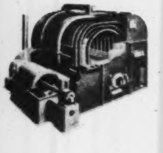
Model BST Brick-Set Tubular Heater, Capacity 2,000,000 b.t.u. to 10,000,000 b.t.u. for permanent central heating installations. The finest space heater ever manufactured.

the LEE line . . .



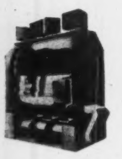
Vertical Tubular Heater

Model VTH Vertical Tubular Heater, Capacities 2,000,000 b.t.u. to 6,000,000 b.t.u. Can be used with or without duct distribution. Portable — requires no special foundation. Ideal for pre-heating large volumes of replacement air.



Steel Encased Tubular Heater

Model TSE Steel Encased Tubular Heater, Capacities 2,000,000 b.t.u. to 6,000,000 b.t.u. for permanent central heating installations. Ideal for space heating, mine ventilating, coal and ore thawing, drying problems.



"Packaged" Unit Heater

Model HD "Packaged" Unit Heater, Heavy duty capacities 300,000 b.t.u. to 2,000,000 b.t.u. Portable. Automatic for oil or gas or combinations. Completely factory assembled and tested.

SPECIFY LEE
Completely engineered heating.

LEE
CORPORATION
1001 TATNALL STREET
WILMINGTON, DELAWARE

NEW BOOKS & REPORTS

Design and Operation of Heating Systems

Heating Design and Practice, by Robert H. Emerick, discusses design and operation of steam, hot water and warm air heating systems; design, application and control of radiant heating and baseboard units, heat pumps, space heaters, etc.; and such components as boilers, stokers, and steam generators. Allied subjects such as combustion of various fuels, and the design of fuel handling and storage systems also are treated.

This 453 page book is available from the publisher, McGraw-Hill Book Co., 330 W. 42nd St., New York 18, at $8.00 a copy.

Correlating Cathodic Protection Systems

Recommendations for correlating cathodic protection systems on underground metallic structures are given in the *Report of the Correlating Committee on Cathodic Protection*, which has been published by the National Association of Corrosion Engineers. The report consolidates and revises the four bulletins prepared by the committee to aid in solving the problems created when adjacent underground metallic cables, pipe lines and rail track are protected from corrosion by applied cathodic currents. Bulletins included treat management information on cathodic protection, cathodic protection notification procedures, cathodic protection technical practices, and joint cathodic protection systems. The correlating committee is composed of representatives of 11 trade and professional organizations and large commercial institutions operating the principal underground metal plants in the U.S.

The bulletin is available from the association, 919 Milam Bldg., Houston, at 50 cents per copy.

Chemical Treatment of Boiler Feed Water

Boiler Feed Water Treatment, (enlarged third edition) by F. J. Matthews, discusses the results of recent research and new developments in plant construction, and presents revised views on such problems as caustic embrittlement, carbonate and phosphate conditioning, priming and production of wet steam, etc. New material has been added on silicate scale, hydrogen and demineralizing zeolites, colloidal conditioning, use of metaphosphate, electrical scale prevention, etc. The different types of natural waters are discussed in detail, and the last section is devoted to water analysis and testing methods.

This 207 page book is available from the publisher, Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, $4.50 a copy.

OTHER BOOKS AND REPORTS RECEIVED

METALLIZING HANDBOOK, published by Metallizing Engineering Co., Inc., presents the technical and practical aspects of the process. Various methods of surface preparation and the application of metallized coatings for machine element work, corrosion work, and special production jobs are detailed.

The 250 page text is available from the company, 38-14 30th St., Long Island City 1, N.Y., at $3.00 a copy, postpaid in the U.S. and Britain only.

WHEN the Hotel Pierre in New York City found that its cooling tower caused objectionable noise, its management was quick to act. Being justifiably proud of its fine reputation, it would not willingly annoy its neighbors, nor would it use those rooms where the noise might bother guests.

INDUSTRIAL SOUND CONTROL, INC. measured the sound level and determined just what sound insulation was needed, and where, and quickly and effectively quieted the noise—to the entire satisfaction of the Pierre, its guests, and its neighbors.

Don't risk your precious public relations because of cooling tower noise. Call on ISC, pioneers since 1937 in cutting BIG NOISES down to WHISPERS. The methods which ISC uses to quiet test cells of the newest and most powerful jet engines, can also solve your noise problems.

(**INDUSTRIAL SOUND CONTROL, INC.** were the originators of industrial sound proofing, and their installations are job-proven over the years.)

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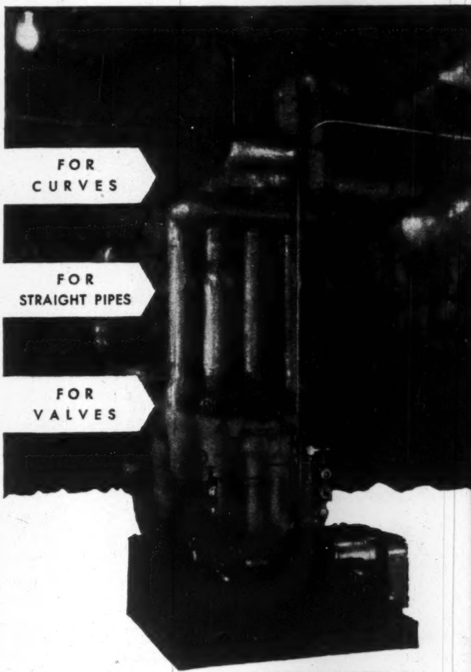
2119 SEPULVEDA BLVD. LOS ANGELES, CALIF.



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INSULATING FELT

OZITE All-Hair Felt has been the best insulation for the refrigeration industry for over half a century. Here's why —

. . . low conductivity provides efficient heat barrier . . . allows close temperature control . . . permits maximum capacity of refrigeration units . . . reduces power consumption . . . does not rot or pack down — resists fire.

For all of the facts about time-proven OZITE send for 4-page Bulletin No. 300.

AMERICAN HAIR & FELT COMPANY
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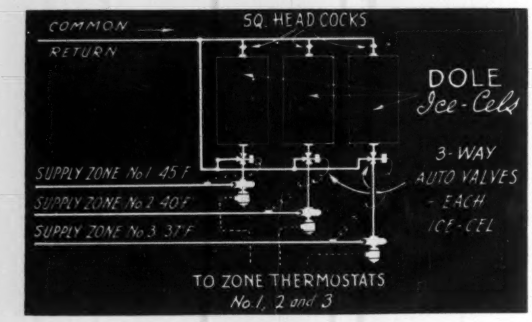
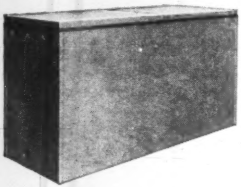
Zoned Air Conditioning



with DOLE Ice Cels



In industrial air conditioning such as bakeries, candy factories, drug manufacturing, commercial photography and X-Ray laboratories, where *several* zones are to be air conditioned, each with its own special dewpoint and temperature, one large compressor simply cannot serve economically, and a number of smaller machines increases the cost unjustifiably.

For such applications, DOLE Ice-Cels provide the answer. A circulating pump and 3-way by pass valve for each zone provide accurately chilled water to each zone and permit one compressor and associated equipment of proper capacity to operate on a 16-hour-per-day cycle with correspondingly lower first cost and with decreased operating and maintenance costs.

The connected horsepower in Ice-Cel installations is often much lower than in coventional direct-expansion systems since peak load periods can be taken care of by longer machine running time, and evaporative condensers and cooling towers can be correspondingly smaller and lower in cost.

There are industrial installations in your territory waiting to be sold. Get your share of this business. Write for engineering data and price list on DOLE Ice-Cels today.

DOC DOLECO says— If your problem is air conditioning you owe it to yourself to investigate the simplicity, efficiency and economy of DOLE Ice-Cells.

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FOR ALL REFRIGERATION PURPOSES

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CHICAGO 30, ILL.
103 Park Ave., New York 17

In Canada: Dole Refrigerating Products Limited
44 Elgin St., Brantford, Ont.

MEETINGS & CONVENTIONS

PLANT MAINTENANCE CONFERENCE AND SHOW—January 14 to 17, Convention Hall, Philadelphia. Registration and hotel information available from Clapp & Poliak, Inc., 341 Madison Ave., New York, exposition management. Exhibitors' list available from Banner & Greif, 250 W. 57th St., New York 19. The conference, which is sponsored by the American Society of Mechanical Engineers and the Society for the Advancement of Management, will stress preventive maintenance for defense production. It will be divided into more than 30 separate sessions to accommodate special talks on individual industry needs.

IBR SCHOOL OF MODERN HEATING—January 15 to 17, Boston Consolidated Gas Co. Bldg., Boston; January 22 to 24, Hempstead, L.I., N.Y.; January 29 to 31, Brooklyn; February 5 to 7, Y.M.C.A. Social Hall, Williamsport, Pa. Sponsored by The Institute of Boiler and Radiator Manufacturers, 60 E. 42nd St., New York 17. The school is a three day course providing instruction in the design and installation of hot water and steam heating systems. A complete list of meetings scheduled through June is available from the institute.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, 62 Worth St., New York—58th annual meeting, January 28 to 30, St. Louis. Next International Heating, Ventilating and Air Conditioning Exposition to be held in conjunction with the society's 59th annual meeting, January, 1953, Chicago. For further information, see ASHVE Journal Section, this issue.

POWER PLANT INSTRUMENTATION SYMPOSIUM—February 7 and 8, Hotel Statler, New York. Regional meeting sponsored by the New York Section, Instrument Society of America. For further information, contact Richard Rimbach, 551 5th Ave., New York 17.

4th ANNUAL AIR CONDITIONING CONFERENCE—February 14 and 15, Engineering and Industrial Experiment Station, College of Engineering, University of Florida, Gainsville.

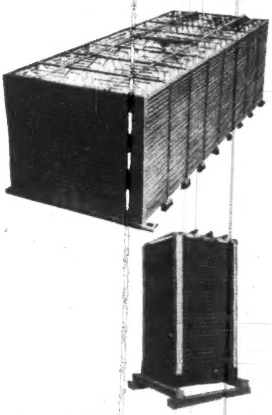
NATIONAL ASSOCIATION OF CORROSION ENGINEERS, 919 Milam Bldg., Houston, Tex.—1952 annual conference, March 10 to 14, Galveston.

CHICAGO INTERNATIONAL TRADE FAIR—March 22 to April 6, Navy Pier, Chicago. For further information contact Chicago International Trade Fair, Inc., Merchandise Mart, Chicago 54.

OIL-HEAT INSTITUTE OF AMERICA, INC., 6 E. 39th St., New York 16—29th anniversary exhibition of the automatic oil-heat industry, April 14 to 18, Commercial Museum, Philadelphia. To be held concurrently with the annual convention, which will be headquartered at the Benjamin Franklin Hotel.

Cooling Towers of all sizes and types

by Binks



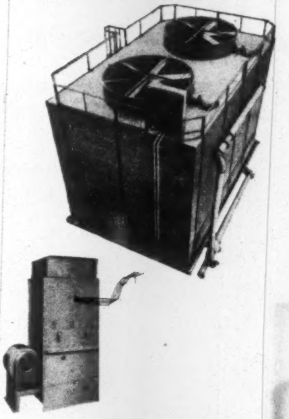
Binks natural draft cooling towers are available in many sizes with capacities from 2.4 to 480 tons of refrigeration.

Binks cooling towers are engineered to give you maximum heat transfer...to save you money on purchase, erection, operation and maintenance costs. They slash your cooling water bills to zero.

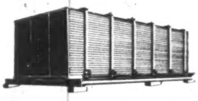
With hundreds of standard Binks towers from which to choose, you can meet specific requirements without the expense of a custom-built tower.

Thousands of Binks towers, operating under widely varied conditions, have proved their superiority in cooling water from refrigeration and air conditioning compressors and water jacketed engines; also for efficient cooling of fluids in food and chemical processing, and manufacturing applications.

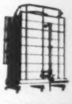
Send today for Bulletins describing in detail Binks full line of natural and mechanical draft cooling towers. State capacity required. Binks Manufacturing Company, 3118-38 Carroll Ave., Chicago 12, Ill.



Binks mechanical draft cooling towers are made in several models with capacities from 3 to 1000 tons of refrigeration.



Binks



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COLD STORAGE

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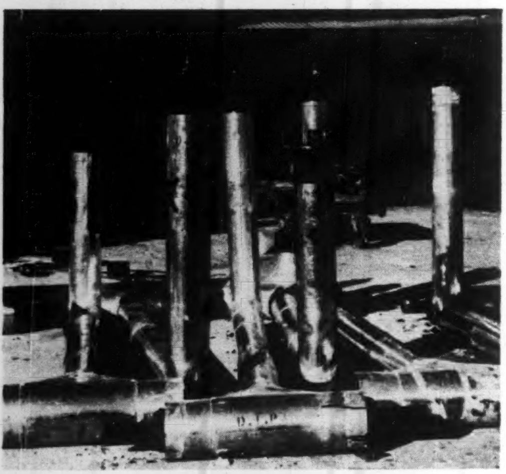
ENGINEERED for Positive Protection



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- DURANT Pre-Sealed INSULATED PIPE is the ORIGINAL positive protection to maintain low heat loss in the conveyance of steam, hot water, or refrigerants in underground or exposed piping. It is completely waterproof and eliminates corrosion and electrolysis.

Many leading architects and engineers specify D. I. P. wherever long term dependable service is required. Both installation and maintenance costs are kept at a minimum. No tile or masonry protection is required and field joint work is a simple four step process.

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DURANT INTERNATIONAL CORPN.
WILLIAMSTOWN
NEW JERSEY

RECENT TRADE LITERATURE

For your convenience in obtaining copies of these bulletins, see coupon on page 259. If you write direct to the manufacturer, describe carefully what literature you want, as the number given first in each item is for use only when sending requests to Heating, Piping & Air Conditioning.

Air Filter

HPAC 101—Folder describes and gives specifications for the "Absolute" air filter, originally developed for the Atomic Energy Commission, and now available for commercial and industrial use — Cambridge Corp., 350 S. Geddes St., Syracuse. This disposable filter is said by the manufacturer to stop particles of dust, smoke and fumes below 0.3 micron in size.

Automatic Controls for Heating and Air Conditioning

HPAC 102—A number of new bulletins and a new catalog replace older ones in the Automatic Controls Manual for Heating and Air Conditioning — Barber-Colman Co., 1228 Rock St., Rockford, Ill. In the hot water-panel heating section, the following new bulletins replace corresponding old ones: F-3157-2, outdoor reset hot water controls, for F-3157-1; F-3765-2, F-4442-1, and F-3840-2, hot water heating control systems, for F-3765-1, F-4442, and F-3840-1 (only minor revisions in these four); and F-4405-1, valve capacities, for F-4405 (additional data). In the unit ventilator control section, F-4322-1, control of large capacity unit ventilator, replaces old bulletin F-4322 (minor revisions). In the engineering information section, the new bulletins F-2138-5, steam flow chart and valve capacities, and F-2139-3, valve capacities, replace F-2138-4 and F-2139-2 (additional data). A new sheet, F-1420-4, discussing the reasons for and applications of proportioning control, is to be inserted after F-2139-3. In the control equipment section, 44 page catalog F-1753-3, controls for heating and air conditioning (thermostats, motor-operated valves, control motors and accessories) replaces catalog F-1753-2.

Carbon Steel Tubing

HPAC 103—Chart covers the increased size range of electric resistance welded carbon steel tubing — Welded Tube Div., The Babcock & Wilcox Tube Co., Alliance, Ohio. It is broken down to reflect both average and minimum wall requirements in two carbon steel grades produced to various ASTM, ASME, AAR and government specifications for pressure tubing and standard specifications for mechanical tubing.

Cast Flanged Valves, Flanges, and Flanged Fittings

HPAC 104—Standard Practice SP-42, 1951 edition, developed and approved by the Manufacturers Standardization Society of the Valve and Fittings Industry, covers 150 lb corrosion resistant cast flanged valves, flanges, and flanged fittings. — The Cooper Alloy Foundry Co., Bloy St. & Ramsey Ave., Hillside, N.J. The standards approved and practices recommended are advisory only.

Now!

B.A.C. COOLING TOWERS

UP TO 225 T.R.

IN A SINGLE FACTORY-ASSEMBLED UNIT

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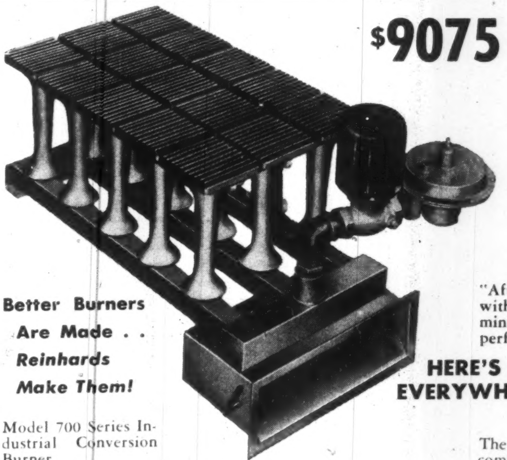
Specializing in Water-Saving Devices Since 1938



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Model 700 Series Industrial Conversion Burner

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That's the outstanding story of one dealer who has been handling Reinhard Burners for many years. He states, "After checking back on our records and making comparison with other burners, we find that our service problem is at a minimum, that our customers are more than happy with the performance of Reinhard Gas Conversion Burners."

HERE'S WHY DEALERS AND DISTRIBUTORS EVERYWHERE FIND REINHARD GAS CONVERSION BURNERS SO PROFITABLE.

The Reinhard Burner line is complete with models for domestic, commercial and industrial installations. Commercial and industrial models from 19,000 to 3,000,000 BTU capacity.
Reinhard commercial and industrial burners are made to fit almost every type of installation.
First quality material, construction and workmanship.
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☐ Without obligation please send me more information about the program for Reinhard Gas Conversion Burners.

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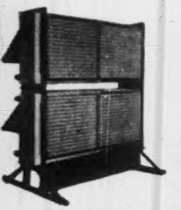
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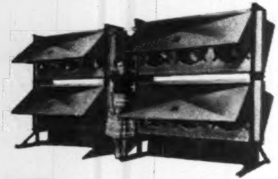
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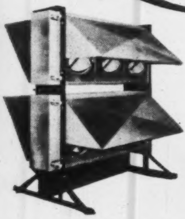
The UNICON eliminates all water problems . . . because it does not require any water. Any size compressor, regardless of tonnage, can be air-cooled with the UNICON by KRAMER. Stands, hood, and wind deflectors are available for simplified outside mounting of this Remote-Type Air-Cooled Condenser.

SPECIAL APPLICATIONS
Write to us about
your condensing problem.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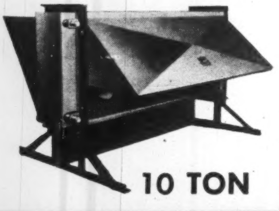
BULLETIN U–177–S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KRAMER TRENTON CO.
Trenton 5, N.J.

Cast Stainless Steel in the Paper Industry

HPAC 105—Reprint of a recent article, *Stainless Steel Castings, Valves and Fittings Beat Corrosion in Paper Industry,* shows typical installations, and includes a table of physical properties of cast alloys, and alloy recommendations for corrosion resistance — The Cooper Alloy Foundry Co., Bloy St. & Ramsey Ave., Hillside, N.J.

Ceiling for Heating, Cooling and Acoustical Control

HPAC 106—Bulletin A-102 describes a ceiling which incorporates radiant heating and cooling with acoustical control—Burgess-Manning Co., 5970 Northwest Highway, Chicago. It explains the principles of radiant heating, the ceiling components, its performance, and gives specifications, installation and application data, etc.

Ceiling Outlets for Air Distribution

HPAC 107—Catalog F-4085-1 (18 pages) covers various types of ceiling outlets (recessed and surface supply, and combination supply and return) and introduces the new "Venturi-Flo-Lite" model (recessed and surface) incorporating a unit for interior lighting — Barber-Colman Co., Air Distribution Div., 1228 Rock St., Rockford, Ill. Information is given on accessories, installation methods, adjustment of air pattern, throat velocities, and performance.

Control of Industrial Noise

HPAC 108—Pamphlet treats industrial noises and their control, illustrating the principles of noise measurement,

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ADJUSTABLE
THERMOSTAT

The new E8N Adjustable Indicating Thermostat is a precise temperature control for gas, liquid, and metal-to-metal applications, such as ovens, hot plate presses, water baths, incubators, proofing cabinets and cold cabinets. It is most useful on units where periodic checks of temperature are required, advisable, or will prove time-saving. The new E8N is simply and ruggedly built, employing the highly sensitive response action of a solidly liquid-filled bulb and bellows assembly to a snap-acting switch and indicating pointer. The thermostat is adjustable over its entire range by a knurled thumbscrew on the front of the case.

SPECIFICATIONS:
Case 5½ x 5½ x 1¾"; Wt. 3 lbs. Standard ranges 50° – 350°F and 50° – 600°F, special ranges may be had between –120°F and +600°F. Standard differentials ½°F in circulating liquid, 2°F in air. Switch ratings 10 amp 125 V AC and 5 amp 250 V AC. Write for new bulletin No. 4816T which gives full details.

UNITED
ELECTRIC
CONTROLS
COMPANY
87 School Street
Watertown, Mass.

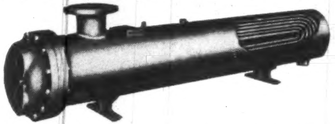
STANDARD & SPECIAL THERMOSTATS
& PRESSURE SWITCHES

WHITLOCK

HEATING AND COOLING

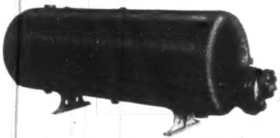
Equipment

☑ INSTANTANEOUS HEATERS



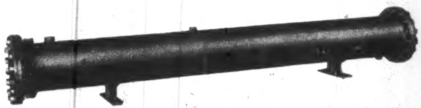
For use where hot water at a nearly uniform rate is desired. Type R shown has a removable U-tube bundle; other designs are available. Write for Bulletin 20A. Write for details on stock heaters.

☑ STORAGE HEATERS



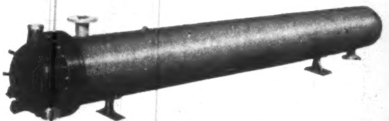
Type K Storage heaters supply ample hot water at all times. Whitlock-Everdur construction assures lifetime service: Also made in Eterno and Standard Steel. See Bulletin 40A. Write for details on stock heaters.

☑ FUEL OIL HEATERS



Preheating promotes efficient atomization and burning. Type V-1 Heater shown is easily cleaned without breaking line connections. Whitlock heaters are made in a wide range of types and sizes. Ask for Bulletin 35.

☑ WATER CHILLERS



For Air Conditioning service Whitlock chillers are built to meet specific job requirements. The dry expansion cooler illustrated is of U-bend design; refrigerant passes through the tubes and cools water in shell — thus less refrigerant is required and danger of freeze-ups is greatly reduced. Ask for recommendations. Write for Bulletin 140.

Whitlock Engineering Service is complete — Bring your heating or cooling problems to us.

THE WHITLOCK MANUFACTURING CO.

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Authorized Representatives in Other Principal Cities
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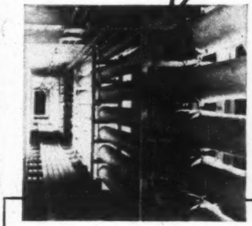
for tomorrow
Ultra-modern utility plant . . . an architectural masterpiece

ENGINEERED *for tomorrow*



. . . Badger EXPANSION JOINTS . . . assure long, trouble-free life . . . an engineering masterpiece

Leading utilities are erecting ultra-modern power plants which are both *designed* and *engineered* for tomorrow. The structures represent the very latest trends in functional design . . . and the steam distribution systems must be engineered to perform with maximum efficiency. As you would expect, Badger Corrugated Packless Expansion Joints, constructed to the famous Directed-Flexing Self-Equalizing design are first choice with these forward-looking utilities.

* * * * * *

What's the reason you find Badger Expansion Joints specified on ***important*** jobs? Because engineers have learned from years of experience to put their faith in the performance of Badger Joints . . . performance that's a result of construction features like these:

- Directed-Flexing Self-Equalizing rings . . . progressively control the movement of the all-curve corrugations.
- Packless . . . pressure-tight single tube — requires no maintenance.
- Compact . . . approximately the size of flanged fitting.
- Special forming . . . no structure-weakening stresses.
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- Wide range of traverse — pressure — temperature.

Fabricated from deoxidized copper for normal pressures and temperatures, stainless steel or alloys to withstand high pressure, temperature and corrosion.

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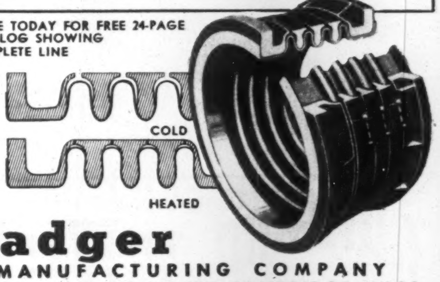

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But more important than sheer beauty to home comfort and the budget is the efficiency and economy offered by AUTORAD radiation. Easy to install, it can be used alike for new or remodelled rooms.

When you think of heating comfort, think of AUTORAD and investigate before you install your next heating job.

Write for complete information.

AUTORAD, INC,

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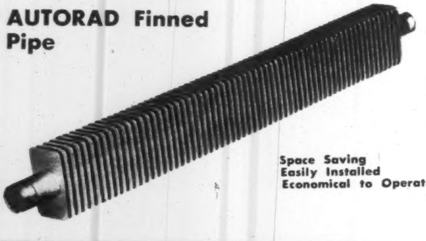
AUTORAD Finned Pipe



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Easily Installed
Economical to Operate

AUTO-RAD CONVECTORS FIN-TYPE RADIATORS

discussing the relationship between noise and the human ear, and stressing the advantages of noise control — Industrial Acoustics Co., 333 Jackson Ave., New York 54.

Controls for Refrigeration and Air Conditioning

HPAC 109—Catalog 53-R, 1951 edition, covers automatic controls for refrigeration and air conditioning applications — General Controls Co., 801 Allen Ave., Glendale 1. It illustrates, and gives dimensions and specifications for various models of thermostatic expansion valves, distributors, strainers, magnetic lever and stop valves, hydramotor valves, thermostats, relays, low pressure controls and high pressure cutouts, etc.

Cylinders

HPAC 110—Bulletin 152 illustrates and describes application of cylinders in chemical plants, oil refineries, plastics, concrete plants, and other industries—Ledeen Mfg. Co., 1600 S. San Pedro St., Los Angeles 15. Cylinders are shown being used in automatic operation of flue dampers, in gate valve operation, etc.

Dehumidifiers

HPAC 111—Bulletin (seven pages) gives general information, and application, capacity and selection data, for automatic dehumidifiers, some of which use the refrigeration and some the adsorption method — Desomatic Products Div., Daly, Merritt & Sullivan, Inc., 1109 W. Broad St., Falls Church, Va.

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Save Space in Tight Spots

JEFFERSON SPECIALTY UNIONS

Close fits are simple with Jefferson Unions . . . and once in they'll STAY in because we make them from a very fine malleable iron with a tensile strength of 55,000 lbs per sq in. Details such as the machining instead of casting the ring channels . . . making the rings from special tubing instead of casting them and testing all fittings with air before delivery all add up to a minimum of maintenance after the installation. You're sure the job's in to stay when the joints are made with Jefferson Specialty Unions.

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AIR VELOCITY

THE *HASTINGS* AIR-METER

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SO SMALL IT FITS IN THE PALM OF YOUR HAND*

IDEAL FOR:

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The HASTINGS AIR-METER is ideal for measurement of air and gas velocities from a low of 5 feet per minute up to 6,000 feet per minute. The instrument's unique principle of operation eliminates the effect of temperature and rate of temperature change. It is not affected by normal atmospheric pressure changes. A compact unit that weighs only 24 ounces. May be operated from a 110 V, 60 cycle a-c outlet or from a battery pack.

*Adaptable to standard extension cords

ALSO THE HASTINGS PRECISION AIR-METER

Developed for field or laboratory use where extreme sensitivity and stability are required. Operates on same principle as standard Air-Meter. Easily adapted for use as a flowmeter or with remote recording or indicating instruments. Reading indicator lag is less than one second. Other special probes available. WRITE TODAY for complete data on both Air-Meters.

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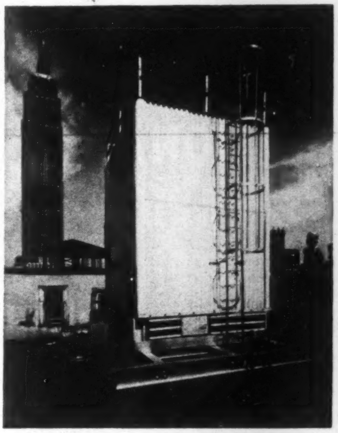
ELECTRONIC, ELECTRICAL, AND MECHANICAL INSTRUMENTS



Don't Let "CMP" Regulations Discourage You From Demanding Fireproof Cooling Towers!

SAVE STEEL BY USING TRANSITE CASING ON STEEL OR REDWOOD FRAMES

"REDUCE MAINTENANCE HEADACHES"
TRANSITE WILL NOT RUST
REQUIRES NO PAINTING!

Transite Towers are available in all sizes above 15 tons

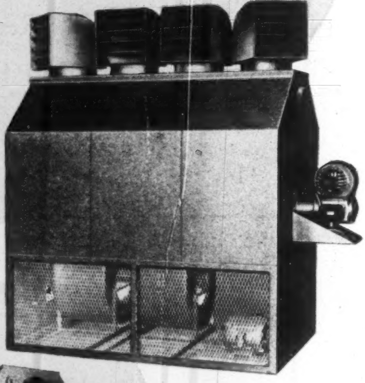
Write for Catalogs No. 206 and 207

Phillips
Cooling Tower Co., Inc.
220 DUPONT ST., BROOKLYN 22, N. Y.

FEATURING TEARDROP DESIGN STAINLESS STEEL FIRE BOX

NATIONAL CHAMPION HEATERS

Direct Fired, Heavy Duty Steel Heaters
. . . for large space heating requirements



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An automatically operated heating system, fully self-contained and highly practicable for industrial and commercial construction. Four way heat discharge heads and floor line return air grilles will guarantee continued working level comfort by controlling the direction and extent of heated air circulation.

Ten Sizes—200,000 to 1,500,000 BTU

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Heavy duty heater suitable for coal, oil or gas firing—easily converted from one fuel to another. Designed for heat treating, drying and furnace replacement applications. Flexible—permits front or either side firing and optional blower placement at rear or either side. Special units to 4,500,000 BTU on specifications.

Seven Standard Sizes—
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Evaporative Condensers, Cooling Towers

HPAC 112—Folder illustrates and describes various models of evaporative condensers (3 to 260 ton capacities), and cooling towers (3 to 225 ton capacities)—Baltimore Aircoil Co., Inc., 715-17 W. Pratt St., Baltimore 1.

Finned Radiation

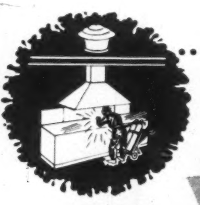
HPAC 113—Bulletin 1251 describes "Fin-Vector" radiation, treating its application in heating industrial, commercial, and institutional buildings — C. A. Dunham Co., 400 W. Madison St., Chicago 6. Sloping top, flat top, and expanded metal enclosures are illustrated, and the adjustable hanger assembly is covered. Dimensions, capacity tables, typical specifications, and ordering instructions are included.

Gas and Oil-Gas Burners

HPAC 114—Bulletin AD-101 describes gas and combination oil and gas burners for commercial and industrial use — Cleaver-Brooks Co., Hev-E Oil Burner Div., 326 E. Keefe Ave., Milwaukee 12. The five models are illustrated, and the forced air draft system and the electronic controls incorporated in the burners are discussed.

Gas Scrubbers

HPAC 115—Bulletin 203-B gives technical data on gas scrubbers, coolers and absorbers for use in chemical plants, steel mills, and other industries — Peabody Engineering Corp., 580 Fifth Ave., New York 19. Included are a capacity curve sheet, cross sectional diagrams and installation photographs.



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JENN-AIR EXHAUSTERS

Low Contour roof unit, available in axial and centrifugal types. Aluminum rust-proof construction assures better ventilation longer.

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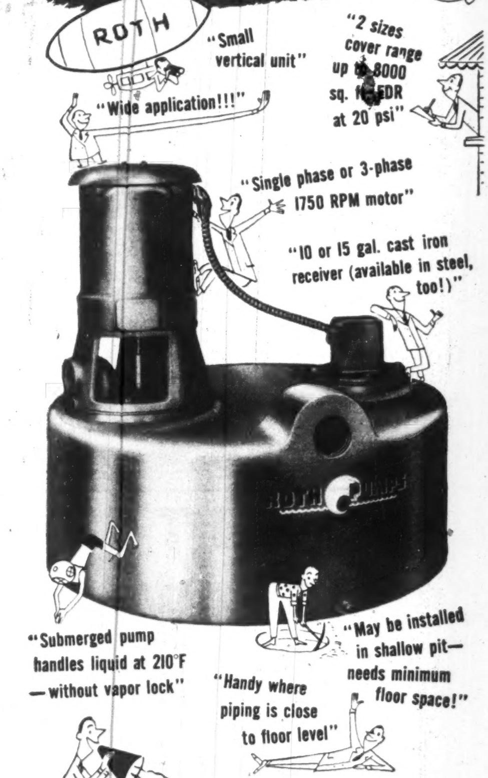
409 ARCHITECTS BUILDING
INDIANAPOLIS 4, INDIANA

NEW CONDENSATE RETURN UNIT

SENSATIONAL


ROTH
"Small vertical unit"
"2 sizes cover range up to 8000 sq. ft. EDR at 20 psi"
"Wide application!!!"
"Single phase or 3-phase 1750 RPM motor"
"10 or 15 gal. cast iron receiver (available in steel, too!)"
ROTH PUMPS
"Submerged pump handles liquid at 210°F —without vapor lock"
"May be installed in shallow pit—needs minimum floor space!"
"Handy where piping is close to floor level"

ALL THIS AT UNBELIEVABLY LOW PRICES!!!

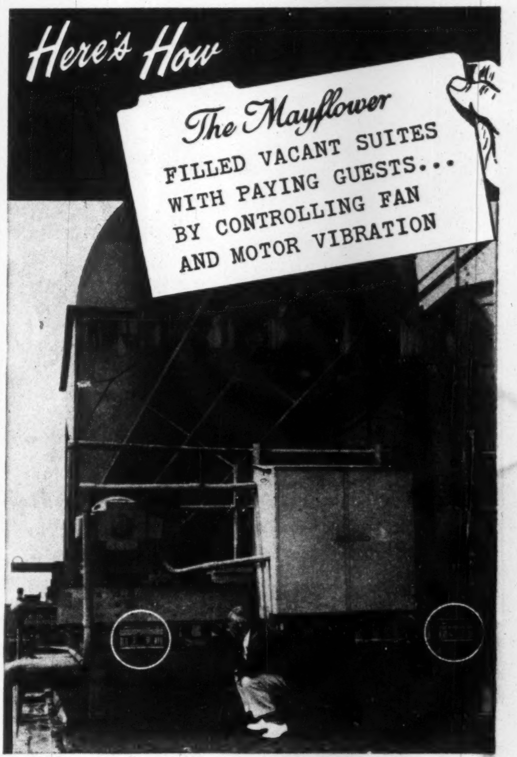
● How can Roth make such a high quality vertical condensate return unit at astonishingly low prices? Roth has geared its manufacturing facilities and experience in mass production of pumps to produce top quality units at a price you can't afford to miss. *Roth Pumps* are made to tolerance of one-thousandth of an inch. Only the finest quality materials are used. Stainless steel shaft, bronze impeller and side plates. Every pump is individually tested. Construction meets the most exacting requirements. Motors and switches are the finest. See your nearest distributor or write direct today. Ask for Bulletin No. 212.

ROTH PUMPS

ROY E. ROTH COMPANY ● 2420-A 24th Avenue, ROCK ISLAND, ILL.

Here's How

The Mayflower
FILLED VACANT SUITES WITH PAYING GUESTS... BY CONTROLLING FAN AND MOTOR VIBRATION



13-Ton Fan and Motor on Roof of Mayflower Hotel, Washington, D. C.

Vibration from this huge cooling tower fan and motor made it impossible to rent suites on the floor below. Even water standing in drinking glasses showed a decided side-to-side movement.

That's all changed now.

As an executive of The Mayflower recently wrote, "Thanks to the recent installation of Korfund Steel Spring Vibro-Isolators, complaints regarding vibration have ceased."

When installed on roofs and upper floors, large fans, high pressure systems (including the centrifugal compressors), and reciprocating compressors require special consideration. It costs surprisingly little to prevent serious vibration problems with Korfund Vibration Control. There are also low cost Korfund mountings for less critical installations such as centrifugal pumps, most ventilating fans, and for basement and factory installations.

The Selector Chart in Bulletin G-104 gives recommendations for isolation of most equipment for both critical and normal conditions. See Sweet's Architectural or Engineering Files, or write for your free copy today. We'll also submit specific recommendations, without obligation. Just contact us, or the Korfund representative you'll find in most principal cities. A half century of experience is at your disposal.

Representatives in Principal Cities

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MASSACHUSETTS . .

By changing the position of the oil cup, the four popular discharges (lower horizontal, upper horizontal, down-blast and up-blast) can be obtained. Sizes 7 to 16½ inches wheel diameter.

WRITE FOR BULLETIN No. 110 CATALOG

MASSACHUSETTS BLOWER DIVISION
The BISHOP & BABCOCK Mfg. Co.
4901 HAMILTON AVENUE · CLEVELAND 14, OHIO

General Purpose Pumps

HPAC 116—Bulletin 52B6351B presents construction details of type SSB grease lubricated, pedestal mounted, general purpose pumps, in capacities to 2500 gpm at heads to 550 ft — Allis Chalmers Mfg. Co., 1171 S. 70th St., Milwaukee.

Heat Exchanger

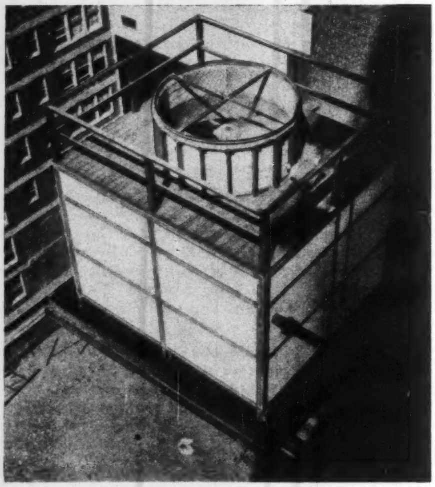
HPAC 117—Bulletin 22 describes a heat exchanger for intermittent and varying flows, with the thermostatic bulb of the temperature regulator located inside a tube which draws samples from the top and bottom of the tank in proportion to the rate of flow, and then mixes them inside the compensator tube — Aerco Corp., 214 Lafayette Place, Englewood, N.J. Construction and operating features are given, and water capacities are tabulated.

Heat Insulation

HPAC 118—Booklet (eight pages) contains information on the various uses of hydrous calcium silicate heat insulation (for temperatures as high as 1200 F)—Kaylo Div., Owens-Illinois Glass Co., Box 1035, Toledo 1. It lists the shapes and sizes available for insulating tubes and pipes of various diameters, and vessels of various sizes, as well as flat surfaces. Data is given on physical characteristics, recommended thicknesses, etc.

Heating Coils

HPAC 119—New edition of bulletin DS-385 describes a complete line of steam and hot water coils for a variety of



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For All Refrigeration and Air Conditioning Requirements

- Individually designed mechanical draft towers of any required capacity for the larger installations.
- Standardized, prefabricated "package" type units of 5 to 30 tons refrigeration for the smaller jobs.

Complete details of design and construction in Bulletin No. 50, showing typical United installations in all fields . . . Power, oil, gas and refrigeration. Write for it today.

This 700 G.P.M. United tower serves the air conditioning system of a large Midwest hotel. It is deck filled, sheathed with cement-asbestos board and equipped with low pressure sprinkler distribution.

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Fans FOR EVERY Industry

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SOUTH BEND AIR PRODUCTS INC
INDIANA

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Aerospot and *Dynaflow* fans rate high in efficiency and safety features . . . offer advanced aerodynamic design and rugged construction. The models shown enjoy wide popularity with industrial users. Any unit may be furnished with **explosion-proof** motor and fan blades.

HEAVY DUTY AEROSPOT

For general or specific ventilation, man-cooling, or parts-cooling . . . to increase personnel efficiency and reduce lost time in cooling and drying hot parts. Portable . . . direction of blast adjustable. Explosion-proof motor, metal conduit and starter can be supplied. Conforms to state safety regulations.

DYNAFLOW UNITS 2-4-6 BLADE TYPES

Six blade model illustrated. For exhausting or blowing against high static pressures. For general ventilation or specific processes where fumes are present. Sizes: 16" to 36" diameter. Capacities: 1240 to 26000 c.f.m. Two and four blade models available for applications at lower static pressures.

EXTENSION ARM DYNAFLOW FOR "HOT" OR "EXPLOSIVE" GASES

For exhausting explosive gases or fumes . . . for circulating "hot" gases up to 350° F. where temperature is too high to permit use of standard or even special motors. Used in heat exchangers, "sweater" ovens, etc. Fans from 16" to 36" diameters.

DUCTYPE UNITS

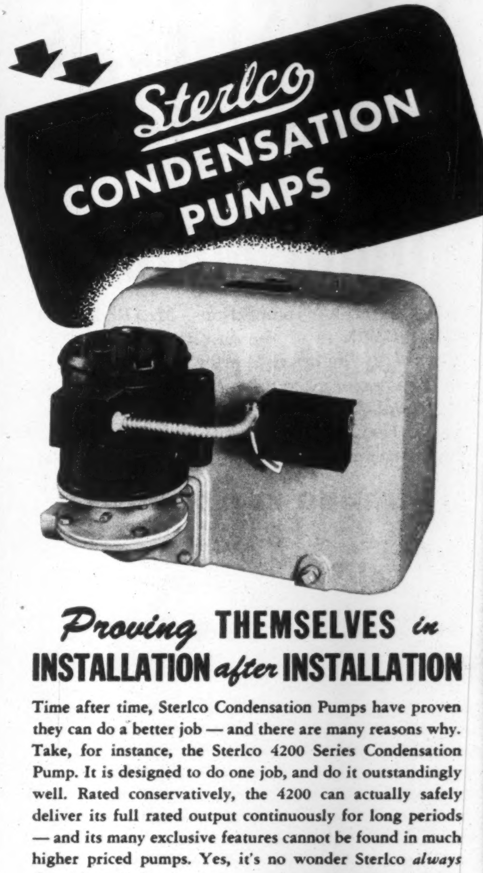
Direct Drive or Belt Drive

Direct drive model shown, also supplied with belt drive for high temperatures or corrosive air and gas handling. Designed for bolting in any duct run at any point or at either end. Sizes: 16" to 36" fans.

Send for complete specifications and listings of other fans available.

WRITE FOR CATALOG

SOUTH BEND AIR PRODUCTS, Inc.
322 EAST COLFAX AVENUE • SOUTH BEND 22, INDIANA



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Proving THEMSELVES *in* INSTALLATION *after* INSTALLATION

Time after time, Sterlco Condensation Pumps have proven they can do a better job — and there are many reasons why. Take, for instance, the Sterlco 4200 Series Condensation Pump. It is designed to do one job, and do it outstandingly well. Rated conservatively, the 4200 can actually safely deliver its full rated output continuously for long periods — and its many exclusive features cannot be found in much higher priced pumps. Yes, it's no wonder Sterlco *always* does a better job.

- **LONG WEARING Carbon-Type ROTARY SEAL**
- **LARGE CAPACITY TANK**
- **COMPACT, NEAT APPEARANCE**
- **EASY ACCESSIBILITY OF PARTS**

New Sterlco 4100 Series for jobs where steel tank is preferred. Same features as 4200.

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Hotel St. Regis Chooses Sterling Quiet Motors

After extensive comparisons, Mr. F. Roullet, Chief Engineer of the St. Regis Hotel, New York City, selected Sterling Type FQ quiet operating motors to drive the fans of the hotel's air conditioning systems. Our service records prove Sterling motors are quieter and give highly dependable service, reports Mr. Roullet.

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OUTSTANDING FEATURES FOR BETTER AIR CONDITIONING:

...quiet operation—protected construction—streamlined design—cool running—direct through ventilation—pre-lubricated, double shielded ball bearings—NEMA dimensions—crossline starting—liberal connection space—dual voltage—vinyl acetal insulated wire in stator windings—molecular welded connections. Available with feet or footless, face or flange mounted, drip-proof or splash-proof.

WRITE FOR BULLETIN NO. FQ-112

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22;
Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

applications, in both standard and non-freeze types — The Trane Co., La Crosse, Wis. Data is given on capacities, selection, performance, installation and dimensions.

Heating, Ventilating, Air Conditioning and Heat Transfer Equipment

HPAC 120—Bulletin PB-290, a condensed catalog (36 pages), presents a complete line of air conditioning, heating, ventilating and heat transfer equipment — The Trane Co., La Crosse, Wis. Covered are refrigeration equipment, multi-room systems, unit air conditioners, coolers and condensers, cooling coils, fans, convectors, wall fin elements, unit heaters, roof ventilators, etc. Descriptions are supplemented with drawings and photographs, and tables summarize the range of capacities, sizes and dimensions.

Humidifier

HPAC 121—Folder discusses comfort and health advantages of humidification, and describes a 22 lb portable humidifier with a ½ to 2½ pt per hr evaporating capacity — Kauffman Air Conditioning Co., 4505 Olive St., St. Louis 8.

Identification of Metals and Alloys

HPAC 122—47 page booklet covers rapid identification (spot testing) procedures for some metals and alloys, which can be used in the laboratory and in the shop—The International Nickel Co., Inc., 67 Wall St., New York 5. It covers qualitative procedures only. Charts and step by step instructions outline tests for very heavy metals such as gold and tungsten; heavy metals such as lead and

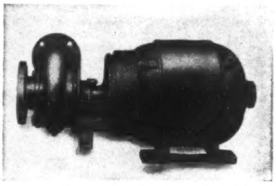


Fig. 3650 Close-Cupld Centrifugal

Four Ways To Get More Satisfied Air Conditioning Customers

1. Quiet operation. A Goulds Close-Cupld pump is the next thing to noiseless.
2. Low power consumption. Goulds late design Close-Cupld pumps have high efficiency—low power input.
3. Breakdown-free operation. Goulds pumps are famous for long service—without inspection or repair.
4. Compact units. Goulds Close-Cupld packs a lot of pump in a small package.

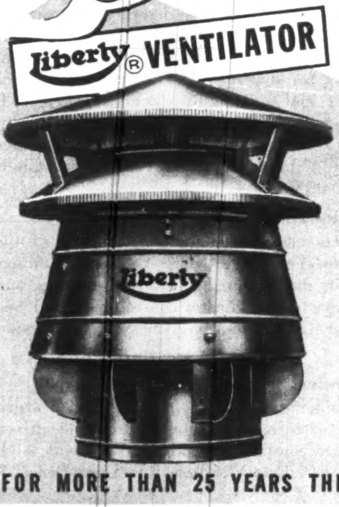
For larger jobs Goulds Double-Suction Centrifugals are equally dependable.

It will pay you to investigate Goulds Close-Cupld line.
Call or write Pump Headquarters for complete information.

Goulds PUMPS INC.
Seneca Falls
New York

PENN VENTILATORS

WORK LIKE A BREEZE



LIBERTY VENTILATOR . . . a reliable standard for modern ventilation. All the air currents—upward, downward, horizontal or swirling—are converted into powerful suction forces by ingenious arrangement of baffles & wind vanes. Capacity Ratings, based on all-angle wind tests*, prove the Liberty free from backdrafts!

*United States Testing Co., Inc. Test #E-1532—9-11-50

DYNAFAN . . . engineered for quiet air removal where static pressure and other special conditions are encountered.

- Motors out of air stream!
- Operating parts easily accessible!
- Statically and dynamically balanced non-overloading fan!
- Units are low—blends well with modern architectural design!

Write for complete literature today! . . . Representatives and Distributors in Principal Cities.

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DYNAFAN®

FOR MORE THAN 25 YEARS THE BUILDERS' ROOF TOP LINE

PENN VENTILATOR CO.
PHILADELPHIA 40, PA.

SAVED $3022 IN *LESS* THAN ONE YEAR

PERFEX INDUSTRIAL INSTRUMENTS paid for themselves in less than one year at the Hartford, Wisc., Municipal Power Plant . . . saved over 14% of the fuel last year.

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INDUSTRIAL INSTRUMENTS

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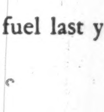

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☐ Please send bulletin and prices on money-saving instruments for heating system checked above.

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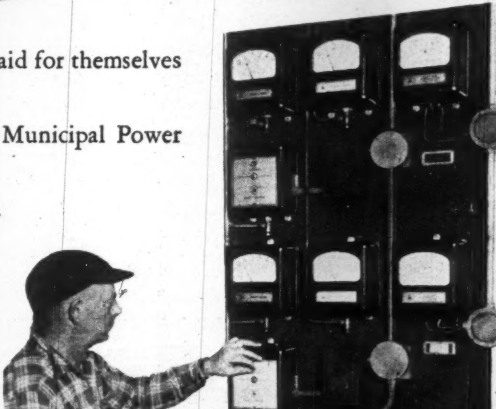
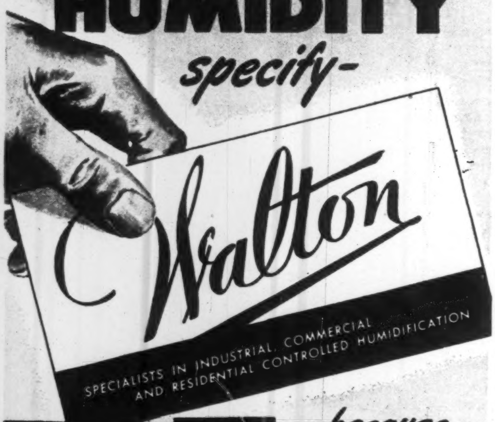


GILBERT WASHBURN, Chief Engineer, Hartford, Wisc., Municipal Power Plant.

When you need
HUMIDITY
specify-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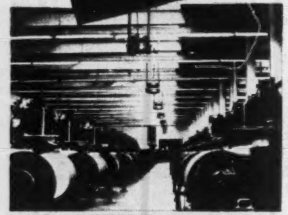
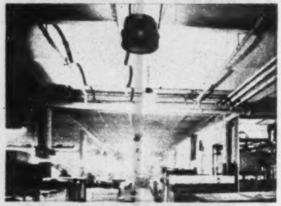
you can satisfy any humidification requirement with modern Walton equipment. All are easily installed, use a minimum of water and electrical current. Thousands of varied installations for industries which must maintain controlled humidity conditions have proven Walton to be the standard for efficient performance and trouble-free operation. Check on the Walton System, now!


Typical TEXTILE Walton Installation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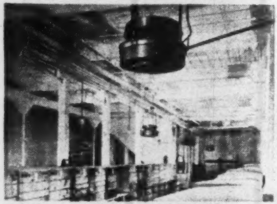
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silver; light metals such as aluminum, and light alloys; and average density metals such as steels, irons, copper and copper alloys, etc. An additional folder, *First Aids in Scrap Salvage*, gives simple tests which can be used to identify nickel and other strategic metals for recovery from scrap.

Indicators, Controllers and Other Equipment

HPAC 123—Bulletin BIF-2 is an index to the various bulletins issued by subsidiary companies %Proportioneers, Inc.%, (chemical porportioning equipment), Omega Machine Co. (feeders for dry materials and the feeding of liquids by gravity), and Builders-Providence, Inc. (recording, indicating and controlling instruments) — B-I-F Industries, P. O. Box 1342, Providence 1. Bulletin listings are accompanied by brief descriptions and illustrations of the equipment they cover.

Industrial Instruments

HPAC 124—Centennial issue (Vol. 3, No. 4) of the house organ, *Taylor Technology*, describes the beginnings of the company, its manufacturing facilities, markets, and products (thermometers, indicator-controllers, etc.) — Taylor Instrument Companies, 95 Ames St., Rochester, N.Y.

Instrument Winder

HPAC 125—Folder describes instrument winder which cranks instead of twists, and is applicable to spring driven motors, temperature controls, and other instruments — J. A. Campbell Co., 645 East Wardlow Rd., Long Beach 7, Calif.

Made especially for YOUR job!

Ro-Fin Tubes

- Straight Lengths
- Custom Designed Coils
- U-Bends
- Unusual Combinations

ROME EXTENDED SURFACE HELICAL FIN TUBING comes in many sizes, some suitable for use with standard flare connections. Fins are solder bonded for permanent integral contact. Used extensively for building refrigeration condensers, blast air cooling or heating coils, inter-coolers and after-coolers, dry cleaning recovery coils. Write for details.

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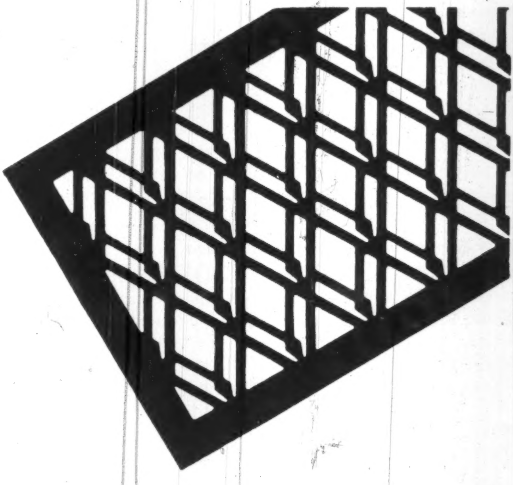

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This attractive Hendrick Ornamental Metal Grille, M No. 2, another exclusive Hendrick design, is one of over a hundred designs offered for your selection.

Many of these designs were originally developed, according to an architect's specifications, to harmonize with the decorative scheme for some outstanding public building or residence. They are now available as standard numbers.

Each can be supplied in a wide range of overall dimensions, bar sizes, and number and size of perforations. Ample open areas assure good air flow.

Made in accurate sizes from heavy gauge metals, with clean-cut perforations, Hendrick Grilles have no burrs or other imperfections. They always lie flat and are easy to install because of a special flattening operation in their manufacture.

Write for complete information.

SEE OUR CATALOG IN SWEET'S

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Architectural Grilles
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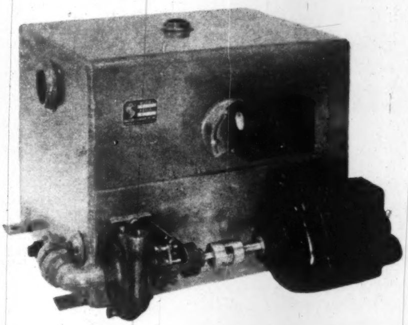

"Illustrated above is the **Eagan "Eagle"** versatile unit, handling 8,000 sq. ft. at 20 P.S.I. and selling for a trade price of **$139.00** F.O.B. Philadelphia.

Eagan Standard Units are made in single and duplex models to 150,000 sq. ft. E.D.R. at pressures to 200 P.S.I.

Your pump problems are invited. Eagan engineers or your local Eagan representative or the factory engineers offer their services for any pump requirement."

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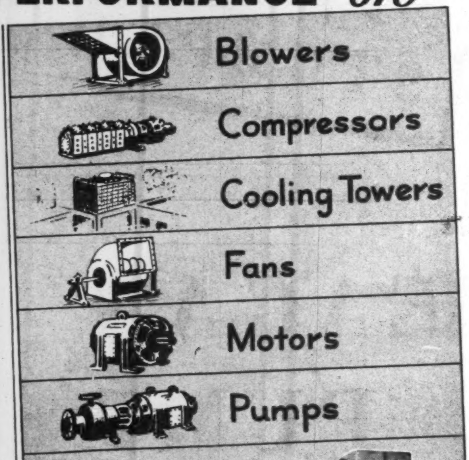
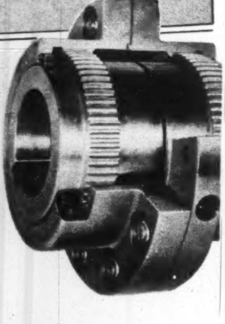
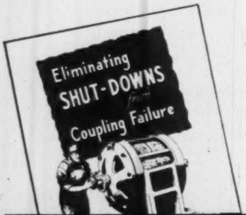
FOR PROVEN COUPLING PERFORMANCE *on*



WALDRON *Improved* Gear Type



From every standpoint—design, construction, operating features—these WALDRON Couplings give greater assurance of longer, trouble-free service. An examination of their many design refinements will quickly explain why they are so consistently specified for all types of applications where dependability of performance is a first essential.


Eliminating SHUT-DOWNS from Coupling Failure

Write for your copy of this new folder which explains in detail the coupling features which provide added insurance against coupling failure. Useful information for every coupling user. Copy will be sent promptly on request.

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New Brunswick,
New Jersey
COUPLINGS

Sales Representatives in Principal Cities.

Low Side Refrigeration Data

HPAC 126—Pocketsized data book on low side refrigeration (52 pages) covers commercial refrigeration and air conditioning equipment, and gives engineering information for refrigeration service men and contractors — Refrigeration Engineering, Inc., 7250 E. Slauson Ave., Los Angeles 22. It describes the full line of "Recold" equipment, and gives information on how to calculate refrigerator loads of various dimensions, on storage requirements for perishable foods, etc.

Low Temperature Metal Treatment

HPAC 127—Folder covers low temperature metal treatment, including such processes as chilling for stabilization of steel, for increasing perishable tool life, and in shrink-fit assembly — Sub-Zero Products Mfg. Div., Deepfreeze Distributing Corp., 3928 Reading Rd., Cincinnati 29. Technical data is given on methods and results of chilling various metals and alloys, and standard and special models of the company's chilling machines are illustrated.

Metal Stitching

HPAC 128—Booklet (12 pages) describes the technique, advantages and limitations of the metal stitching method of fastening metals to metals and metals to nonmetals with high tensile strength wire stitches — Acme Steel Co., 2840 Archer Ave., Chicago 8.

Oil Pipe Line Pumping Motors

HPAC 129—Bulletin 200-SYN-34, a house organ issue, features the story of how the "world's largest" motors for

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MODEL A-555

THE AUTOMATIC SHUTTER WITH ALL THE FEATURES

FRONT VIEW—CLOSED

IT TAKES THE LOAD OFF THE FAN!

Aluminum louvers open fully, permitting capacity fan operation. New heavy reinforcement strip adds strength and long life to the louvers, assures quiet operation and perfect counterbalance, prevents rattling. Deep shroud protects shutter from high winds. Tie-rod, brackets and bearings inside frame, not exposed to weather. Special finish resists corrosion. Many other features.

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Solves Your Hot Water Problems with *On-the-Spot Supply*

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High Delivery

HOT WATER HEATERS

7 MODELS
93 to 850 GPH

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Costly Piping
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Temperature Loss

Need hot water in remote locations? Wash-up rooms? New additions? Peak periods? An Aldrich High-Delivery hot water heater supplies from 93 to 850 gallons an hour. Heating is direct, saves slow storage. And you save long piping runs, complex installations. Aldrich heaters are designed for low-cost efficiency, from either oil or gas. They need little space, can be put in existing buildings without major alterations... save space on new construction.

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HEATING AND AIR CONDITIONING PRODUCTS

BLAST HEATING COILS—AIR CONDITIONING COILS—ALL TYPES

All copper spiral fin tube construction with the tubes formed or bent permits uniform expansion without strain. Headers are heavy wall construction with tubes brazed into extended ferrules formed in the headers. Fins are helically wound and metallically bonded. May we send catalog?

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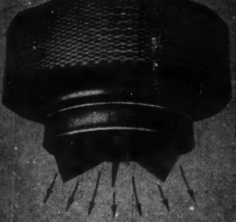

A proven heating unit, modern in design, incorporating every unit heater advancement. McCord copper spiral fin tube construction creates air turbulence without undue restriction. Improved fan blades deliver large volume of air with minimum air noise. Guaranteed for 150 lbs. saturated steam pressure. Specify McCord.

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A time proven heating unit, modern streamlined in design, quiet, yet its rugged construction adapts it to all types of installations, guaranteed for use on No. 150 p.s.i. steam pressure. All copper heating element, individual spiral fin tubes free to expand without strain on joints. Standard motors with standard bases used. Wide range of capacities.

Save fuel with McCord Unit Heaters.

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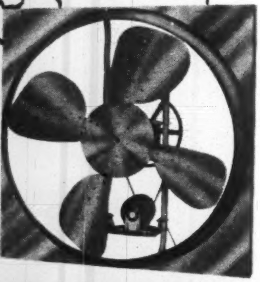
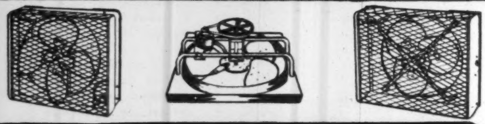
For beauty, comfort, appeal and getting-the-job-done—*nothing* sells like Murray window and ventilating fans. Be prepared for the summer boom in ventilation. See your Murray distributor today. See below.



Murray

INDUSTRIAL FANS • 7 SIZES UP TO 17,386 CFM
RESIDENTIAL FANS • WINDOW & ATTIC • 4 STYLES 20" WINDOW TO 54" ATTIC



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JUST DROP IN PLACE

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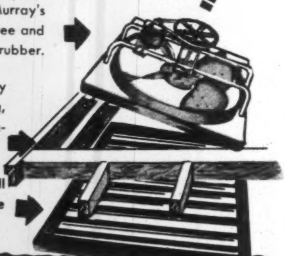
Any-one-can-install-it simplicity makes *Murray* the fastest selling, most demanded package unit ventilating fan available.

Shutters are fully automatic. No pull cords, no adjusting—means more sales.



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COMPANY OF TEXAS
VENTILATING & WINDOW FANS

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oil pipe line pumping were designed and built — Electric Machinery Mfg. Co., Minneapolis 13. Photographs show construction features.

Ordering Valves

HPAC 130—*How to Get What You Need When You Order a Valve,* is a reprint of a recent article discussing the information necessary to enable the manufacturer, supply company or sales representative to fit the proper valve for the application at hand — The Cooper Alloy Foundry Co., Bloy St. & Ramsey Ave., Hillside, N.J. It covers data required when ordering manually operated, power operated, and instrument operated valves, pressure and temperature regulators, traps and level controllers, and relief and check valves.

Plaster Aggregates

HPAC 131—Bulletin covering "Coralux" annealed perlite aggregates (plaster, acoustical, concrete) includes a section on concrete aggregate for insulation — F. E. Schundler & Co., Inc., 45-15 Vernon Blvd., Long Island City, N. Y. Preparation instructions and specifications are given.

Production of Stainless Steel Products

HPAC 132—*Alloys in Cooperland,* illustrated booklet describes a trip taken by the Walrus (of *Alice in Wonderland*) through a plant producing stainless steel alloy products—The Cooper Alloy Foundry Co., Bloy St. & Ramsey Ave., Hillside, N.J. Appropriate for children as well as adults, it is available at $1.00 a copy to the gen-

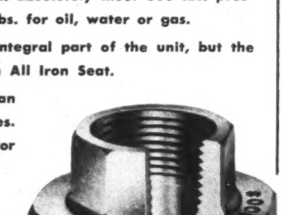
for HIGH pressures or temperatures

it's the RIFCO 300

The Rifco 300 union is a rugged quality product especially suitable where high pressures or temperatures are encountered. Heavily constructed throughout, with thick pipe ends and nut it will absolutely meet 300 lbs. pressure for steam or 400 lbs. for oil, water or gas.

The bronze seat is an integral part of the unit, but the 300 is also available in All Iron Seat.

The Rifco 300 will put an end to fitting worries. Please write us today for more information.



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BURNER
COMBINES OIL AND GAS
TRADE MARK REG U S PAT OFF

ECONOMICAL • DEPENDABLE • COMPLETELY *Automatic Heat*

Write for Literature **SIEMON and CO.**
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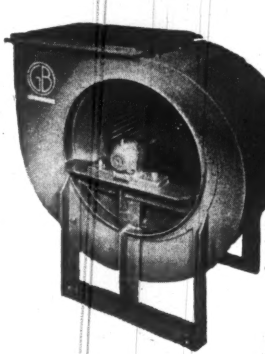

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Supplied in both Forward and Backward-blade types, single-inlet, single-width only for exhausting air impregnated with dust, fumes, lint, etc. Arrangement 1 fans are built without obstruction in the inlet, and allow the free passage of air. Specially constructed to handle air at higher temperatures than that of standard air.

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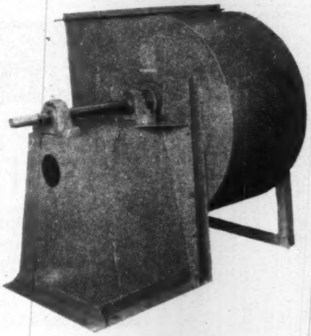
Arrangement 3 Fans: for all types of ventilating systems Supplied in both Forward and Backward-blade types of single inlet, single width construction, or double inlet double width construction. Capacities range from 200 cfm to 250,000 cfm.



The heavier construction of classes II, III and IV cover the particular needs of special applications.

Engineering Offices In All Principal Cities.

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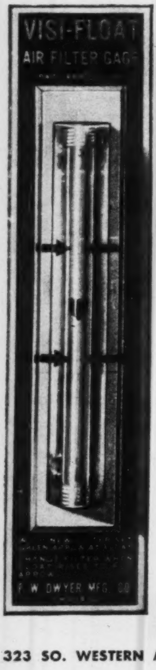
Pioneer Manufacturers of Square Finned Tubing in the United States



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DWYER

VISI-FLOAT

ONLY $3.25

First gage of its type for permanent mounting on forced air units. Low-cost . . . foolproof . . . self-operating. Tells at a glance from face of heater, air-conditioner, or ventilator when filters are clogged and need replacement. No liquids, no mechanical parts to break down. VISI-FLOAT comes ready to use. A clear, lifetime, lucite body with a floating indicator. Connected across filter, and reacts constantly to varying pressure drop due to dirt accumulation. Lasts the life of the unit. Just drill two holes and mount. Let VISI-FLOAT cut fuel bills, allow more and cleaner air flow, reduce blower failure and repairs.

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eral public. Requests should be directed to the company. A complimentary copy is offered to all those connected with the chemical and allied industries.

Protective Coatings for Glass, Ceramics, Refractories and Metals

HPAC 133—*New Approaches to Surface Protection*, a 12 page booklet, describes "White Hot" and "Pyro-Chrome" coating, designed to protect refractories, metal, ceramics and glass from extreme temperatures up to 2840 and 4000 F, respectively, and from the penetration of corrosive gases of combustion and molten slag — Preferred Utilities Mfg. Corp., 1860 Broadway, New York 23.

Pyrometer Supplies

HPAC 134—Catalog 100-4 (buyers' guide) gives technical data on the application and use of thermocouple pyrometric supplies — Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Station 40, Wayne and Windrim Aves., Philadelphia 44.

Refrigeration Products

HPAC 135—Catalog 521 illustrates and describes various types of dryers, accumulators, capillary tubes, filter cones, gaskets, oil separators, speed couplers, and other refrigeration products—Wabash Mfg. Co., 2300-18 South Western Ave., Chicago 8. It introduces a line of spun dryers, strainers and accumulators all of which have soldered connections.

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552 RIVER ROAD EDGEWATER, N. J.

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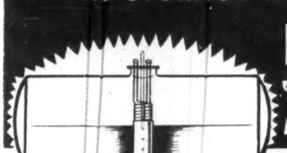
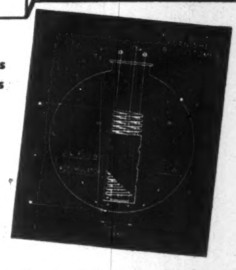


REMPE "Hot Spot" PREHEATER

Write for details and price



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REMPE COMPANY

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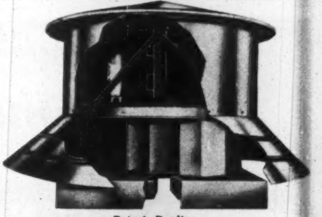

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Catalog No. 22
General Industrial Spray Nozzles
Catalog No. 23
Pneumatic Atomizing Nozzles

Repulsion-Start Induction Motor

HPAC 136—Folder describes and illustrates the Type RA repulsion-start induction motor, a single phase motor designed for starting heavy loads with low starting current — Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14.

Research in Air Diffusion

HPAC 137—Vol. 7, No. 3, 1951 issue of the house organ, *Aspiration*, describes a research, testing and demonstration laboratory for developing air diffusers and similar air conditioning equipment — Anemostat Corp. of America, 10 E. 39th St., New York 16. The test chambers are shown, and primary research problems and the role of instrumentation in research are discussed.

Silencers for Cooling Towers

HPAC 138—Brochure lists causes of cooling tower noise and various methods of noise elimination (air intake and air discharge silencers, acoustical panels for the cooling tower walls, noise and vibration eliminators for the foundation, etc.), showing typical applications of silencing equipment — Industrial Acoustics Co., Inc., 333 Jackson Ave., New York 54.

Spray Nozzles

HPAC 139—Folder 2386 gives information on spray nozzles for cleaning various kinds of materials, screens, etc. — Link-Belt Co., 307 N. Michigan Ave., Chicago 1. Installation pictures show applications, and dimensions are tabulated for nozzles for pipes of 1 to 3 in. in diameter.

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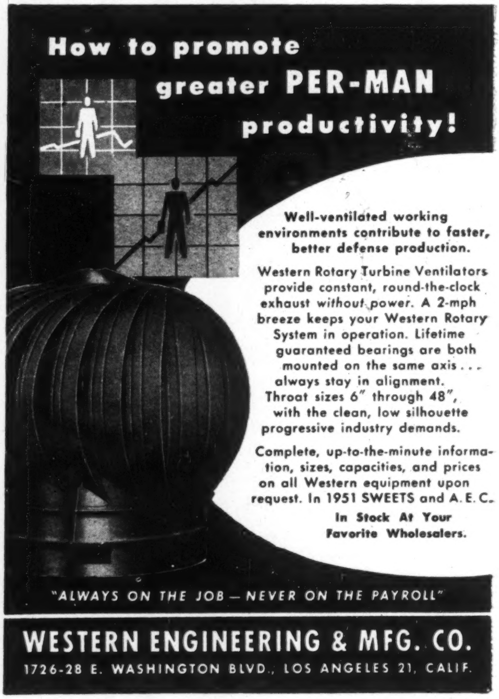
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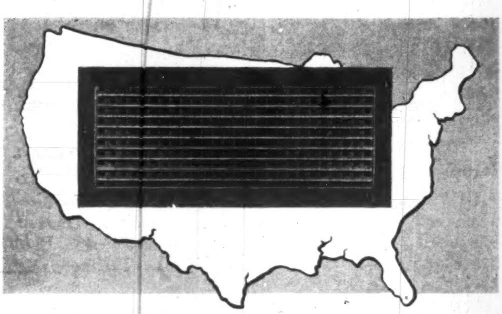

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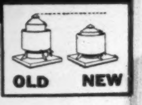

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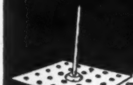

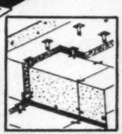

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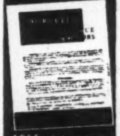

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Steel Pipe

HPAC 140—Folder describes standards of production for furnace welded steel pipe — Wheatland Tube Co., Bankers Securities Bldg., Juniper & Walnut Sts., Philadelphia 7. A price list is given for piping in various weights and sizes.

Temperature and Pressure Controllers

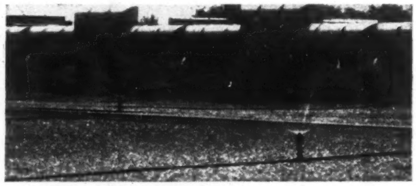
HPAC 141—Bulletin 1320 describes and gives specifications for "TAG" self operated temperature and pressure controllers — Tagliabue Instruments Div., Weston Electrical Instrument Corp., Dept. 67, 614 Frelinghuysen Ave., Newark 5, N.J.

Testing and Measuring Equipment

HPAC 142—Catalog GEC-1016 (80 pages) diagrams, tabulates and describes the uses, features and specifications of more than 130 testing and measuring devices for industry — General Electric Co., Schenectady 5. It contains publication references to bulletins that describe each device in more detail. Covered are leak detectors, vacuum and pressure gages, d-c amplifiers, electric and electronic circuit testing equipment, etc.

Thermometers

HPAC 143—Specification sheet 600 describes indicating and recording thermometers, giving construction and engineering details — Minneapolis-Honeywell Regulator Co., Industrial Div., Station 40, Wayne and Windrim Aves., Philadelphia 44.



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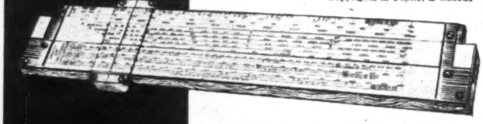

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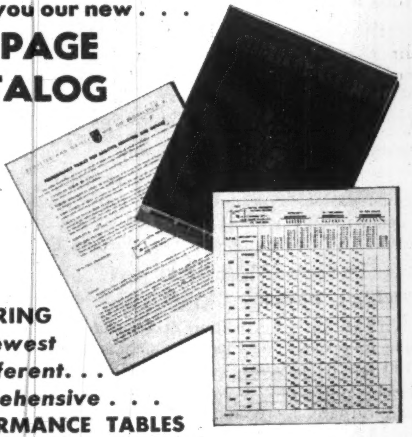

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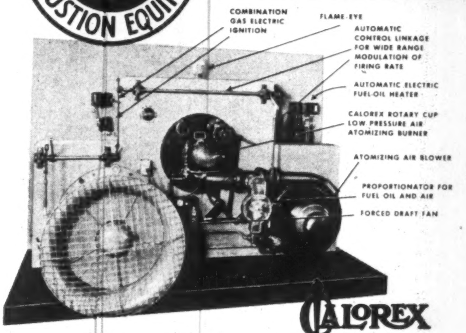
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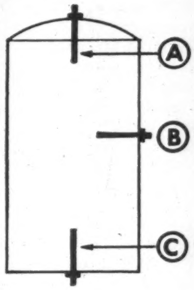

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Tube Bending Machine

HPAC 144—Folder describes the "Bend-Ex" automatic air compression tubular bending machine, designed to make over 900 bends per hr — Paul Machine Tool & Die Works, 4600 S. Kedzie Ave., Chicago 32. Operation procedure is explained and illustrated.

Welding and Cutting Equipment

HPAC 145—Catalog 20-C covers welding and cutting units, various types of torches, torch nozzles and tips, regulators for welding and cutting, and similar equipment — Victor Equipment Co., Welding Equipment Div., 844 Folsom St., San Francisco 7.

Welding Design

HPAC 146—4th edition of *Manual of Welding Design and Engineering* (72 pages) contains information on over 100 low temperature welding alloys for use on cast iron, steel, copper, etc., and covers all heating methods: torch, arc, furnace, inert arc, induction, etc. — Eutectic Welding Alloys Corp., Dept. P, 172nd St. and Northern Blvd., Flushing, New York 58.

Wet Pit Pumps

HPAC 147—Bulletin W-317-B12 covers "Freeflo" pumps for sump, sewage and drainage service — Worthington Pump and Machinery Corp., Harrison, N.J. Features outlined include a non-clogging impeller and a stuffing box (above the impeller) equipped with U-cup packing. A graph of coverage for 60 cycle motor speeds, and dimension and flange data are included.

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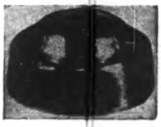

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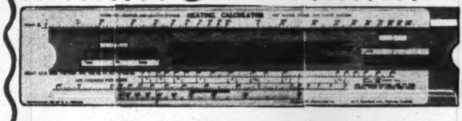

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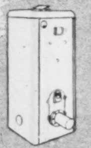

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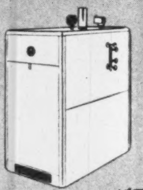

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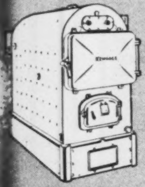

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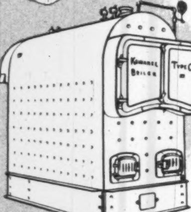

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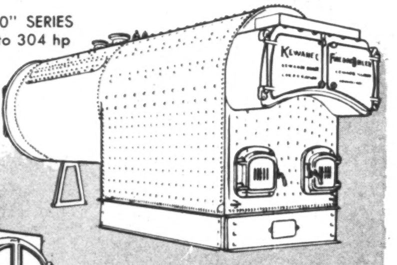

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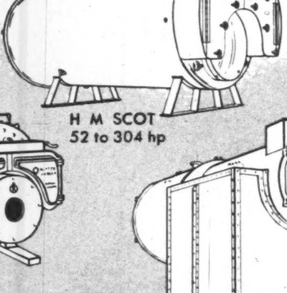

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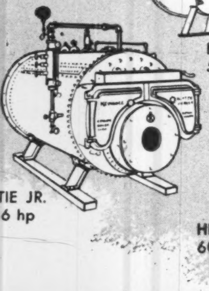

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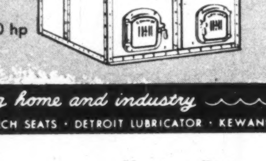

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SECTION OF JANUARY 1952 HEATING, PIPING & AIR CONDITIONING

1952 DIRECTORY

Heating, Piping and Air Conditioning Equipment for Industrial, Commercial, Institutional and Public Buildings

PART 1–Products Classified–Page 2d

If you want to know the names of one or more manufacturers making a certain product, look in Part 1, where products are classified alphabetically in "directory style" with the noun governing (for instance, "unit heaters" are listed under "heaters, unit").

PART 2–Trade Names–Page 95d

If you have the trade name of a product and want to know who manufactures it, look in Part 2, where trade names are alphabetically listed. Trade names the same as or identifiable from the company name are not listed. Manufacturers with such trade names can be easily identified under their product classifications in Part 1.

PART 3–Manufacturers' Addresses–Page 111d

For the complete name and address of any manufacturer look in Part 3.

● The manufacturers whose names are dotted throughout the listings advertise in this issue. See Index to Advertisers (on page 128d) for the page on which you will find the advertising of any of these manufacturers.

Heating, Piping & Air Conditioning
6 N. Michigan Ave.
Chicago 2, Illinois

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HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 1—PRODUCTS CLASSIFIED

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See Hose, Metal and Fittings; Bases and Pads, Vibration Isolating

ABSORBERS, VIBRATION, FOR REFRIGERANT LINES

American Metal Hose Branch, The American Brass Co., Waterbury, Conn.
Atlantic Metal Hose Co.. Inc., New York, N. Y.
Chicago Metal Hose Corp., Maywood, Ill.
Finn & Co., New York, N. Y.
Firestone Industrial Products, Akron, O.
Johnson Metal Hose, Inc., Waterbury, Conn.
Packless Metal Products Corp., New Rochelle, N. Y.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Pleasantaire Corp., Washington, D. C.
Resitoflex Corp., Belleville, N. J.
Seamlex Co., Inc., Long Island City, N. Y.
Techniflex Corp., Port Jervis, N. Y.
Titeflex, Inc., Newark, N. J.
United Metal Hose Co., Inc., Long Island City, N. Y.
Wade Mfg. Co., Elgin, Ill.

ABSORPTION DEHUMIDIFIERS

See Dehumidifiers, Absorption and Adsorption

ABSORPTION REFRIGERATION MACHINES

See Machines, Refrigeration, Absorption

ACCESS DOORS AND PANELS

See Doors and Panels, Access

ACCUMULATORS, REFRIGERATION (FOR AIR CONDITIONING)

●Acme Industries, Inc., Jackson, Mich.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Dole Refrigerating Co., Chicago, Ill.
Doyle and Roth Mfg. Co., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
●McQuay, Inc., Minneapolis, Minn.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Phillips & Co., H. A., Chicago, Ill.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Temprite Products Corp., Birmingham, Mich.
Vilter Mfg. Co., The, Milwaukee, Wis.
Wabash Mfg. Co., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
XL Refrigerating Co., Chicago, Ill.

ADHESIVES, FOR PIPE COVERING

Arabol Mfg. Co., New York, N. Y.
●Armstrong Cork Co., Lancaster, Pa.
Cork Import Corp., Englewood, N. J.
Flintkote Co., The, New York, N. Y.
Foster Co., Benjamin, Philadelphia, Pa.
Keasbey Co., Robert A., New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
●Miracle Adhesives Corp., New York, N. Y.
Moore Inc., Goodloe E., Danville, Ill.
●Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.
Pecora Paint Co., Inc., Philadelphia, Pa.
Presstite Engineering Co., St. Louis, Mo.
Sauereisen Cements Co., Pittsburgh, Pa.
Standard Asbestos Mfg. Co., Chicago, Ill.
Stic-Klip Mfg. Co., Cambridge, Mass.

ADSORBERS, ODOR

Carbide and Carbon Chemicals Div., Union Carbide & Carbon Corp., New York, N. Y.
●Connor Engineering Corp., W. B., Danbury, Conn.
Pur Air Div., American Solvent Recovery Corp., Columbus, O.
●Refinite Corp., Omaha, Neb.
Research Products Corp., Madison, Wis.
Tamms Industries, Inc., Chicago, Ill.

ADSORPTION DEHUMIDIFIERS

See Dehumidifiers, Absorption and Adsorption

AFTERCOOLERS, COMPRESSED AIR

Adams Co., Inc., R. P., Buffalo, N. Y.
American Locomotive Co., Alco Products Div., New York, N. Y.
American Moistening Co., Providence, R. I.
Andale Co., Philadelphia, Pa.
Armstrong Co., Richard M., Westchester, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Brown Fintube Co., The, Elyria, O.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
Condenser Service & Engineering Co. Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Downington Iron Works, Downington, Pa.
Doyle and Roth Mfg. Co., Brooklyn, N. Y.
Electric Sprayit Co., The, Sheboygan, Wis.
Goodyer Industries, Inc., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Griscom-Russell Co., The, New York, N. Y.
Halstead & Mitchell, Pittsburgh, Pa.
Heat-X-Changer Co., Inc., Brewster, N. Y.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Ingersoll-Rand Co., New York, N. Y.
Johnson Corp., The, Three Rivers, Mich.
●Joy Mfg. Co., Pittsburgh, Pa.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
●Niagara Blower Co., New York, N. Y.
Parks-Cramer Co., Fitchburg, Mass.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pennsylvania Pump & Compressor Co., Easton, Pa.
●Rome-Turney Radiator Co., Rome, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Ruemelin Mfg. Co., Milwaukee, Wis.
Schramm, Inc., West Chester, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Wilson Engineering Corp., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.
●Young Radiator Co., Racine, Wis.
Yula Water Heaters, Inc., New York, N. Y.

AIR AFTERCOOLERS

See Aftercoolers, Compressed Air

AIR BREAK FITTINGS

See Fittings, Draining, Fixed Air Break

AIR CLEANERS

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AIR COMPRESSORS

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AIR CONDITIONERS

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AIR CONDITIONING UNITS

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AIR ELIMINATORS

See Eliminators, Air

AIR FILTER CLEANING COMPOUNDS

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AIR FILTER GAGES

See Gages, Air Filter

AIR FILTERS

See Filters, Air

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AIR-TANKLESS WATER HEATERS
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AIR WASHERS
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ALARMS, HIGH AND LOW BOILER WATER
American District Telegraph Co., New York, N. Y.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Campbell Co., J. A., Long Beach, Calif.
Coral Designs, Long Island City, N. Y.
Defender Instrument & Regulator Co., St. Louis, Mo.
Diamond Power Specialty Corp., Lancaster, O.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Fischer & Porter Co., Hatboro, Pa.
Johnson Corp., The, Three Rivers, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Magnetrol, Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Milton Roy Co., Philadelphia, Pa.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
●Penn Controls, Inc., Goshen, Ind.
Preferred Utilities Mfg. Corp., New York, N. Y.
Reliance Gauge Column Co., Cleveland, O.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Unit Alarm Co., The, Schenectady, N. Y.
Wright-Austin Co., Detroit, Mich.
●Yarnall-Waring Co., Philadelphia, Pa.

ALARMS, LIQUID LEVEL, AUDIBLE
American District Telegraph Co., New York, N. Y.
Automatic Control Co., St. Paul, Minn.
B/W Controller Corp., Birmingham, Mich.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Boston Auto Gage Co., Pittsfield, Mass.
Bristol Co., The, Waterbury, Conn.
Clark Controller Co., Cleveland, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Liquidepth Indicators, Inc., Long Island City, N. Y.
●Maid-O'-Mist, Inc., Chicago, Ill.
Milton Roy Co., Philadelphia, Pa.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Reliance Gauge Column Co., Cleveland, O.
Ripley Co., Inc., Middletown, Conn.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scully Signal Co., Cambridge, Mass.
Uehling Instrument Co., Paterson, N. J.
Unit Alarm Co., The, Schenectady, N. Y.
Wright-Austin Co., Detroit, Mich.

ALARMS, SMOKE
American District Telegraph Co., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Combustion Control Corp., Cambridge, Mass.
Defender Instrument & Regulator Co., St. Louis, Mo.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Edwards, L. V., Rockville Center, N. Y.
Ess Instrument Co., Bergenfield, N. J.
Ess Specialty Corp., Bergenfield, N. J.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
General Power Plant Corp., New York, N. Y.
McNeill Engineering Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Ripley Co., Inc., Middletown, Conn.
Unit Alarm Co., The, Schenectady, N. Y.
Worner Electronic Devices, Rankin, Ill.

ALGAE AND SLIME CONTROL, WATER TREATMENT FOR
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ALUMINUM COATED SHEETS
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ALUMINUM PIPE
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ALUMINUM SHEETS
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ANALYZERS, CARBON DIOXIDE, PORTABLE
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Barclay, Inc., Robert, Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Engelhard, Inc., Chas., Newark, N. J.
General Power Plant Corp., New York, N. Y.
●Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Permutit Co., New York, N. Y.
Preferred Utilities Mfg. Corp., New York, N. Y.
Service to Industry, West Hartford, Conn.
Uehling Instrument Co., Paterson, N. J.
Will Corp., Rochester, N. Y.

ANEMOMETERS
Barclay, Inc., Robert, Chicago, Ill.
Dietzgen Co., Eugene, Chicago, Ill.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
●Taylor Instrument Companies, Rochester, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.

ANGLE VALVES
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ANGLES, BARS, BEAMS, CHANNELS AND TEES (LIGHT WEIGHT SHAPES)
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Atlantic Steel Co., Atlanta, Ga.
Bethlehem Steel Co., Bethlehem, Pa.
Byers Co., A. M., Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
●Columbia Steel Co., United States Steel Corp., Subsidiary, San Francisco, Calif.
Decatur Iron & Steel Co., Decatur, Ala.
Dow Chemical Co., The, Midland, Mich.
Inland Steel Co., Chicago, Ill.
Inland Steel Products Co., Milwaukee, Wis.
International Steel Co., Evansville, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Kling Bros. Engineering Wks., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Lees, John, Div., The Serrick Corp., Muncie, Ind.
Mesker Steel Corp., Geo. L., Evansville, Ind.
Republic Steel Corp., Cleveland, O.
●Revere Copper and Brass, Incorporated, New York, N. Y.
Reynolds Metals Co., Louisville, Ky.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Fairfield, Ala.
Truscon Steel Co., Youngstown, O.
●United States Steel Co., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

ANODES, FOR CORROSION PROTECTION
Magnode Products, Inc., Trenton, O.

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ARC WELDING ELECTRODES

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ASBESTOS PACKING

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AXIAL FLOW FANS

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BALANCING ELBOWS FOR HOT WATER HEATING SYSTEMS

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BALANCING EQUIPMENT

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BALANCING VALVES

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BALL BEARINGS

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BAROMETRIC CONTROLS

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BASEBOARD RADIATION

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BASES, MOTOR, TENSION ADJUSTING

Ackermann Mfg. Co., Wheeling, W. Va.
Alexander Bros., Philadelphia, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Electrovent Fan & Mfg. Co., Chicago, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schnacke, Inc., Evansville, Ind.
Valley Foundry & Machine Works, Inc., Fresno, Calif.

BASES AND PADS, VIBRATION ISOLATING

●Buffalo Forge Co., Buffalo, N. Y.
Celotex Corp., The, Chicago, Ill.
Chicago Die Casting Mfg. Co., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
Cork Import Corp., Englewood, N. J.
Cork Insulation Co., Inc., New York, N. Y.
Fabreeka Products Co., Inc., Boston, Mass.
Felters Company, The, Boston, Mass.
Finn & Co., New York, N. Y.
Firestone Industrial Products, Akron, O.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hobsite Products Co., Harrison, N. J.
Johns-Manville, New York, N. Y.
●Korfund Co., Inc., Long Island City, N. Y.
Lord Mfg. Co., Erie, Pa.
M B Mfg. Co., Inc., The, New Haven, Conn.
●Mundet Cork Corp., North Bergen, N. J.
National Lead Co., New York, N. Y.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Raybestos-Manhattan, Inc., Passaic, N. J.
Robinson Aviation, Inc., Teterboro, N. J.
Sponge Rubber Products Co., Shelton, Conn.
United Cork Companies, Kearny, N. J.
United States Rubber Co., New York, N. Y.
Vibration Eliminator Co., Long Island City, N. Y.
Western Felt Works, Chicago, Ill.

BEARINGS, BALL

Ahlberg Bearing Co., Chicago, Ill.
Bearings Co. of America, Lancaster, Pa.
●Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Landis & Gyr Inc., New York, N. Y.
Link-Belt Co., Indianapolis, Ind.
Marlin-Rockwell Corp., Jamestown, N. Y.
New Departure Div., General Motors Corp., Bristol, Conn.
Nice Ball Bearing Co., Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Philadelphia, Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Thomson Industries, Inc., Manhasset, N. Y.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, NEEDLE

Roller Bearing Co. of America, Trenton, N. J.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.

BEARINGS, PILLOW BLOCK

Ahlberg Bearing Co., Chicago, Ill.
Anti-Friction Bearings Co., Los Angeles, Calif.
Caldwell Co., W. E., Louisville, Ky.
Central Die Casting & Mfg. Co., Inc., Chicago, Ill.
Chain Belt Co., Milwaukee, Wis.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Clizbe Bros., Mfg. Co., Plymouth, Ind.
Congress Drives Div., Detroit, Mich.
Dick Co., Inc., R. & J., Passaic, N. J.
●Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Freed Products Co., Moline, Ill.
Goldens' Foundry & Machine Co., Columbus, Ga.
Jeffrey Mfg. Co., Columbus, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Lau Blower Co., Dayton, O.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Moraine Products Div., General Motors Corp., Dayton, O.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Randall Graphite Bearings, Inc., Lima, O.
Royersford Foundry & Machine Co., Inc., Royersford, Pa.
SKF Industries, Inc., Philadelphia, Pa.
Shafer Bearing Corp., Downers Grove, Ill.
Sprout, Waldron & Co., Muncy, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.
Triangle Mfg. Co., Oshkosh, Wis.
Whiteley Bearing Corp., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, ROLLER

●Dodge Mfg. Corp., Mishawaka, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Trenton, N. J.
Royersford Foundry & Machine Co, Inc., Royersford, Pa.
SKF Industries, Inc., Philadelphia, Pa.
Shafer Bearing Corp., Downers Grove, Ill. (self aligning)
Timken Roller Bearing Co., Canton, O.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, SLEEVE

Bronze Bearings, Inc., Cranford, N. J.
Chemalloy Associates, Santee, Calif.
Cleveland Graphite Bronze Co., Cleveland, O.
●Dodge Mfg. Corp., Mishawaka, Ind.
Federal-Mogul Corp., Detroit, Mich.
Green Fuel Economizer Co., Beacon, N. Y.
International Powder Metallurgy, Inc., Ridgway, Pa.
Johnson Bronze Co., New Castle, Pa.
Keystone Carbon Co., Inc., St. Marys, Pa.
Medart Co., St. Louis, Mo.
Moraine Products Div., General Motors Corp., Dayton, O.
Morganite, Inc., Carbon Specialties Div., Long Island City, N. Y.
Randall Graphite Bearings, Inc., Lima, O.
Thomson Industries, Inc., Manhasset, N. Y.
Whiteley Bearing Corp., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

BELLOWS, THERMOSTATIC AND METALLIC

●Bishop & Babcock Mfg. Co., Cleveland, O.
Bridgeport Thermostat Div., Robertshaw-Fulton Controls Co., Bridgeport, Conn.
Chicago Metal Hose Corp., Maywood, Ill.
Clifford Mfg. Co., of Standard-Thomson Corp., Waltham, Mass.
Cook Electric Co., Chicago, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
●Sterling, Inc., Milwaukee, Wis.
●Zallea Bros., Wilmington, Del.

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BELTING, FLAT, LEATHER

Alexander Bros., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Chicago Belting Co., Chicago, Ill.
Graton & Knight Co., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schieren Co., Chas. A., New York, N. Y.
Sikes Co., S. R., Minneapolis, Minn.
Williams & Son, I. B., Dover, N. H.

BELTING, FLAT, RUBBER

Boston Woven Hose & Rubber Co., Cambridge, Mass.
Dick Co., Inc., R. & J., Passaic, N. J.
Gates Rubber Co., The, Denver, Colo.
Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hamilton Rubber Mfg. Corp., Trenton, N. J.
Manheim Mfg. & Belting Co., Manheim, Pa.
Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.

BELTS, V

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
America Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Browning Mfg. Co., Inc., Maysville, Ky.
Chicago Belting Co., Chicago, Ill.
Continental Rubber Wks., Erie, Pa.
Dayton Rubber Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J.
●Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Manheim Mfg. & Belting Co., Manheim, Pa.
Maurey Mfg. Corp., Chicago, Ill.
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schieren Co., Chas. A., New York, N. Y.
Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.
Wood's Sons Co., T. B., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

BENDERS, PIPE

American Pipe Bending Machine Co., Inc., Poultney, Vt.
American Pipe Tool Co., Chicago, Ill.
Blackhawk Mfg. Co., Milwaukee, Wis.
●Buffalo Forge Co., Buffalo, N. Y.
Crown Die & Tool Co., Chicago, Ill. (Hand)
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Holsclaw Bros., Inc., Evansville, Ind.
Hossfeld Mfg. Co., Winona, Minn.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Pacific Machine & Iron Wks., Tacoma, Wash.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Pines Engineering Co., Inc., Aurora, Ill.
Radiant Devices, St. Louis, Mo.
Sac Tool Mfg. Co., St. Louis, Mo.
Tal Bender, Inc., Milwaukee, Wis.
Vanderman Mfg. Co., Willimantic, Conn.
Wallace Supplies Mfg. Co., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.

BENDERS, TUBING

Bernz Co., Otto, Rochester, N. Y.
Blackhawk Mfg. Co., Milwaukee, Wis.
●Buffalo Forge Co., Buffalo, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Griffith Equipment Co., Inc., Los Angeles, Calif.
Holsclaw Bros., Inc., Evansville, Ind.
Hossfeld Mfg. Co., Winona, Minn.
Imperial Brass Mfg. Co., Chicago, Ill.
Keeney Mfg. Co., Newington, Conn.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Pacific Machine & Iron Wks., Tacoma, Wash.
Parker Appliance Co., The, Cleveland, O.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Pines Engineering Co., Inc., Aurora, Ill.
Republic Steel Corp., Steel and Tubes Div., Cleveland, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Steel City Electric Co., Pittsburgh, Pa.
Tal Bender, Inc., Milwaukee, Wis.
Wallace Supplies Mfg. Co., Chicago, Ill.

BENDS, EXPANSION, STEAM PIPE

American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Harris & Co., Arthur, Chicago, Ill. (Stainless & non-ferrous)
Kellogg Co., M. W., The, New York, N. Y. (Corrugated steel)
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
National Valve & Mfg. Co., Pittsburgh, Pa.
Ohio Pipe Bending & Machine Co., Cleveland, O.
Parks-Cramer Co., Fitchburg, Mass.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
●Power Piping Div., Blaw-Knox Construction Co., Pittsburgh, Pa.
●Rempe Co., Chicago, Ill.
●Ric-wiL Co., Cleveland, O.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Shaw Co., Benjamin F., Wilmington, Del.
Shaw-Kendall Engineering Co., Toledo, O.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
●Walworth Co., New York, N. Y.
Western Piping & Engineering Co., San Francisco, Calif.
Whitlock Mfg. Co., Hartford, Conn.

BI-METALS, THERMOSTATIC

Baker & Co., Inc., Newark, N. J.
Chace Co., W. M., Detroit, Mich.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa.
Wilson Co., H. A., The, Newark, N. J.

BLADES, PROPELLER FAN

Ackermann Mfg. Co., Wheeling, W. Va.
Aeromatic Propeller Dept., Baltimore, Md.
Aerovent Fan Co., Inc., Piqua, O.
Aire-Foile Fan & Blower Co., Detroit, Mich.
Airmaster Corp., Chicago, Ill.
Alliance Mfg. Co., Alliance, O.
Beckett & Co., Inc., Thomas, Dallas, Tex.
Bronson Fan Mfg. Co., Los Angeles, Calif.
Burden Co., Alan E., Hollywood, Calif.
C & H Air Conditioning Fan Co., Inc., Atlanta, Ga.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dual-Air Fan Co., South Elgin, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
International Engrg. Inc., Dayton, O.
●Joy Mfg. Co., Pittsburgh, Pa.
Martin Fan & Blower Co., Chicago, Ill.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Motionair Co., Los Angeles, Calif.
Myers Electric Co., Inc., Pittsburgh, Pa.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
Peerless Electric Co., Warren, O.
●Propellair Div., Robbins & Meyers Inc., Springfield, O.
Roto-Beam, Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Sensenich Corp., Lancaster, Pa.
●South Bend Air Products, Inc., South Bend, Ind.
Standard Electric Mfg. Co., West Berlin, N. J.
Thermal Industries, Indio, Calif.
Torrington Mfg. Co., Torrington, Conn.
Torrington Mfg. Co., The, Western Div., Los Angeles, Calif.
Utility Appliance Corp., Beverly Hills, Calif.
Wind-Way Fan & Ventilator Co., New Orleans, La.

BLAST GATES

See Gates, Blast

BLAST HEATERS

See Surface, Finned, Heating

BLAST HEATING COILS

See Surface, Finned, Heating

BLINDS, LINE, PIPE

Hamer Oil Tool Co., Long Beach, Calif.

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BLOCKS, TERMINAL, FOR ELECTRICAL CONNECTIONS

General Electric Co., Apparatus Dept., Schenectady, N. Y.
Marathon Electric Mfg. Corp., Wausau, Wis.

BLOW PIPE FITTINGS

See Fittings, Blow Pipe

BLOWER FANS

See Fans, Axial Flow and Fans, Centrifugal

BLOWER HOUSINGS

See Housings, Fan

BLOWER WHEELS

See Wheels, Blower

BLOWERS, HIGH PRESSURE

For Low Pressure Blower Fans, See Fans, Centrifugal

●Aladdin Heating Corp., Oakland, Calif.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
●American Blower Corp., Detroit, Mich.
●Bayley Blower Co., Milwaukee, Wis.
Beach-Russ Co., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Carling Turbine Blower Co., Worcester, Mass.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
●Chicago Blower Corp., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
Day Co., The, Minneapolis, Minn.
●De Laval Steam Turbine Co., Trenton, N. J.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Eastern Air Devices, Inc., Brooklyn, N. Y.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
●General Blower Co., Morton Grove, Ill.
●Ilg Electric Ventilating Co., Chicago, Ill.
●Ingersoll-Rand Co., New York, N. Y.
●Iron Fireman Mfg. Co., Cleveland, O.
●Joy Mfg., Pittsburgh, Pa.
Lammert & Mann Co., Chicago, Ill.
Lamson Corp., Blower Div., Syracuse, N. Y.
Mahr Mfg. Co. Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
Martin Fan & Blower Co., Chicago, Ill.
North American Mfg. Co., Cleveland, O.
Power Engineering Co., Chicago, Ill.
●Prat-Daniel Corp., East Port Chester, Conn.
Read Standard Corp., Blower-Stoker Div., Erie, Pa.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Standard Electric Mfg. Co., West Berlin, N. J.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Beverly Hills, Calif.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.

BLOWERS, SOOT

Bayer Co., St. Louis, Mo.
Diamond Power Specialty Corp., Lancaster, O.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Marion Machine Foundry & Supply Co., Marion, Ind.
Perfection Grate & Stoker Co., Springfield, Mass.

BLOW-OFF VALVES

See Valves, Blow-off

BLUE PRINT MACHINES

See Machines, Blue Print and White Print

BOARDS, PANEL AND CONTROL

Bristol Co., The, Waterbury, Conn.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
●Marsh Heating Equipment Co., Skokie, Ill.
Square D Co., Detroit, Mich.
Taller & Cooper, Inc., Brooklyn, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.

BOILER CLEANING COMPOUNDS

See Compounds, Boiler Cleaning

BOILER FEED PUMPS

See Pumps, Boiler Feed

BOILER FEEDERS

See Feeders, Water, Heating Boiler

BOILER GAGES

See Gages, Liquid Level

BOILER OBSERVATION PORTS

See Ports, Observation, Boiler

BOILER SEALING COMPOUNDS

See Compounds, Boiler and Radiator Sealing

BOILER AND TANK INSULATION

See Insulation, Boiler and Tank

BOILER TUBES

See Tubes, Boiler

BOILER WATER ALARMS

See Alarms, High and Low Boiler Water

BOILERS, ELECTRIC

See Generators, Steam, Electric

BOILERS, HEATING, CAST IRON, SECTIONAL

2000 *Sq Ft Steam Radiation and Over*

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Bastian-Morley Co., Inc., LaPorte. Ind.
Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Burnham Corp., Boiler Div., Irvington, N. Y.
●Crane Co., Chicago, Ill.
Dunkirk Radiator Corp., Dunkirk, N. Y.
International Heater Co., Utica, N. Y.
Peerless Heater Div., The Eastern Foundry Co., Boyertown, Pa. (gas fired)
●Mueller Furnace Co., L. J., Milwaukee, Wis.
National Radiator Co., The, Johnstown, Pa.
Peerless Heater Div., The Eastern Foundry Co., Boyertown, Pa. (gas fired)
Pennsylvania Furnace & Iron Co., Warren, Pa.
Prox Co., Inc., Frank, Terre Haute, Ind.
Richmond Radiator Co., New York, N. Y.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Surface Combustion Corp., Toledo, O.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Michigan City, Ind.

BOILERS, HEATING, STEEL, FIRE TUBE

2000 *Sq Ft Steam Radiation and Over*

●Aldrich Co., Wyoming, Ill.
Alert Boiler & Mfg. Co., Detroit, Mich.
American Shipbuilding Co., Cleveland, O.
●Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Atlantic Steel Boiler Co., Philadelphia, Pa.
Bigelow Co., New Haven, Conn.
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Burnham Corp., Boiler Div., Irvington, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Dewey-Shepard Boiler Co., Indianapolis, Ind.
Crotty Mfg. Corp., Flushing, L. I., N. Y.
Dillon Steam Boiler Wks., Inc., D. M., Fitchburg, Mass.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Erie City Iron Wks., Erie, Pa.
Farrar & Trefts, Buffalo, N. Y.
Federal Boiler Co., Inc., Midland Park, N. J.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Hamburg Boiler Works, Inc., Hamburg, Pa.
Hodge Boiler Wks., East Boston, Mass.
International Engineering Wks., Inc., Framingham, Mass.
Johnston Bros., Inc., Ferrysburg, Mich.
●Kewanee Boiler Corp., Kewanee, Ill.
Leffel & Co., James, Springfield, O.
Lookout Boiler & Mfg. Co., Chattanooga, Tenn.
Mt. Hawley Mfg. Co., Inc., Peoria, Ill.
Murray Iron Wks. Co., Burlington, Ia.
National Radiator Co., The, Johnstown, Pa.
●Orr & Semblower, Inc., Reading, Pa.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
Republic Boiler Corp., New York, N. Y.
Smith Twin Tubular Boiler Co., Inc., Philadelphia, Pa.
●Spencer Heater, Lycoming-Spencer Division, Avco Mfg. Corp., Williamsport, Pa.
Stout & Sons, David, St. Louis, Mo.
●Terre Haute Boiler Works Co., Terre Haute, Ind.
●Titusville Iron Wks. Co., The, Titusville, Pa.
Union Iron Wks., Erie, Pa.
Wickes Boiler Co., Saginaw, Mich.

BOILERS, HEATING, STEEL, WATER TUBE

Anetsberger Bros., Inc., Northbrook, Ill.
●Babcock & Wilcox Co., New York, N. Y.
Bigelow Co., The, New Haven, Conn.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Brown Products Co., Forest Hills, N. Y.

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Bryan Steam Corp., Peru, Ind.
Central States Steel Boiler Co., Chicago, Ill.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Crotty Mfg. Corp., Flushing, L. I., N. Y.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Edge Moor Iron Wks., Inc., Edge Moor, Del.
Erie City Iron Wks., Erie, Pa.
Heilman Boiler Wks., Inc., Allentown, Pa.
International Boiler Wks. Co., The, East Stroudsburg, Pa.
International Engineering Wks., Inc., Framingham, Mass.
Keeler Co., E., Williamsport, Pa.
Morheat Corp., Lansing, Mich.
Mund Boilers, Inc., Los Angeles, Calif.
Murray Iron Wks., Co., Burlington, Ia.
Riley Stoker Corp., Worcester, Mass.
Springfield Boiler Co., Springfield, Ill. (750 to 25,000 lb per hr, 160 psi and above, gas and oil fired)
Super Mold Corp., Lodi, Calif.
●Titusville Iron Works Co., The, Titusville, Pa.
Union Iron Works, Erie, Pa.
V. & E. Products, Inc., Schuylkill Haven, Pa.
Viking Mfg. Corp., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
Waterfilm Boilers, Inc., Jersey City, N. J.
Wickes Boiler Co., Saginaw, Mich.
Will-Burt Co., The, Orrville, O.

BOILERS, PACKAGED STEAM GENERATING UNITS, HEATING AND PROCESS—*including Controls, Feed Pump, etc.*

●Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Babcock & Wilcox Co., New York, N. Y.
●Boiler Engineering & Supply Co., Phoenixville, Pa.
Cla-Val Co., Alhambra, Calif.
●Cleaver-Brooks Co., Milwaukee, Wis.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Consolidated Boiler Corp., Boston, Mass.
Continental Boiler Co., Phoenixville, Pa.
Cyclotherm Corp., Oswego, N. Y.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Edge Moor Iron Works, Inc., Edge Moor, Del.
Erie City Iron Works, Erie, Pa.
●Foster Wheeler Corp., New York, N. Y.
Heilman Boiler Wks., Inc., Allentown, Pa.
Johnston Bros., Inc., Ferrysburg, Mich.
Keeler Co., E., Williamsport, Pa.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Littleford Bros., Inc., Cincinnati, O.
Martin Co., Inc., J. O., San Francisco, Calif.
Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Mund Boilers, Inc., Los Angeles, Calif.
●Orr & Sembower, Inc., Reading, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Sellers Engineering Co., Chicago, Ill.
Springfield Boiler Co., Springfield, Ill.
●Superior Combustion Industries, Inc., New York, N. Y.
●Titusville Iron Works Co., The, Titusville, Pa.
Vapor Heating Corp., Chicago, Ill.
Wickes Boiler Co., Saginaw, Mich.
●York-Shipley, Inc., York, Pa.

BOLTS, EXPANSION

Chase Brass & Copper Co., Waterbury, Conn.
Chicago Expansion Bolt Co., Chicago, Ill.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Industrial Screw Co., Chicago, Ill.
Kenney Co., L. C., Chicago, Ill.
Master Craft Products, Jamaica, N. Y.
National Lead Co., New York, N. Y.
Paine Co., Chicago, Ill.
Rawlplug Co., Inc., The, New York, N. Y.
Star Expansion Bolt Co., New York, N. Y.
U. S. Expansion Bolt Co., York, Pa.

BOLTS AND STUDS, FLANGE

Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., North Tonawanda, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Bros. Bolt Co., Milldale, Conn.
Continental Screw Co., New Bedford, Mass.
●Crane Co., Chicago, Ill.
Erie Bolt & Nut Co., Erie, Pa.
Harper Co., H. M., Morton Grove, Ill.
Haskell Mfg. Co., Wm. H., Pawtucket, R. I.
Industrial Screw Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
Rockford Screw Products Co., Rockford, Ill.
Russell, Purdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS, TOGGLE AND ANCHOR

Carpenter & Paterson, Inc., East Boston, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Expansion Bolt Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Industrial Screw Co., Chicago, Ill.
Moore, Inc., Goodloe E., Danville, Ill.
Paine Co., Chicago, Ill.
Rawlplug Co., Inc., The, New York, N. Y.
Star Expansion Bolt Co., New York, N. Y.
U. S. Expansion Bolt Co., York, Pa.

BOOTHS, PAINTING, SPRAY

●Binks Mfg. Co., Chicago, Ill.
Black Mfg. Co., The, Parkton, Md.
Centri-Spray Corp., Detroit, Mich. (wet type)
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
DeVilbiss Co., The, Toledo, O.
Electric Sprayit Co., The, Sheboygan, Wis.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Kirk & Blum Mfg. Co., Cincinnati, O.
Mahon Co., R. C., Detroit, Mich.
Newcomb-Detroit Co., Detroit, Mich.
Peters-Dalton, Inc., Detroit, Mich.
Plummer Spray Equipment Co., Napolean, O.
Schmieg Industries, Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
Young & Bertke Co., Cincinnati, O.

BRAKES, SHEET METAL, HAND

Barth Mfg. Co., Milldale, Conn.
Dreis & Krump Mfg. Co., Chicago, Ill.
Eiker Mfg. Co., Ogallala, Neb.
Excelsior Tool & Machine Co., East St. Louis, Ill.
New Albany Machine Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Works, Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
St. Louis Tool Co., St. Louis, Mo.
Webb Machine & Tool Co., Imperial, Pa.
Weiss & Co., H., New York, N. Y.
Whitney Metal Tool Co., Rockford, Ill.

BRAKES, SHEET METAL, PORTABLE

Barth Mfg. Co., Milldale, Conn.
Dreis & Krump Mfg. Co. Chicago, Ill.
Eiker Mfg. Co., Ogallala, Neb.
Harris, A. R., Hammond, Ind.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Webb Machine & Tool Co., Imperial, Pa.
Whitney Metal Tool Co., Rockford, Ill.

BRAKES, SHEET METAL, POWER

Bath Co., Cyril, The, Cleveland, O.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Crane & Engineering Co., Steelweld Div., Wickliffe, O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Heartley Machine & Tool Co., Toledo, O.
Munton Mfg. Co., Franklin Park, Ill.
Ohl & Co., Geo. A., Newark, N. J.
Peck, Stow & Wilcox Co., Southington, Conn.
Verson Allsteel Press Co., Chicago, Ill.
Verson Mfg. Co., The, Dallas, Tex.
Weiss & Co., H., New York, N. Y.
Whitney Metal Tool Co., Rockford, Ill.

BRASS PIPE

See Pipe, Brass and Copper

BRASS TUBING

See Tubing, Brass and Copper

BRASS UNIONS

See Unions, Brass

BRASS VALVES

See Valves, Gate; and Valves, Globe

BRAZING TORCHES

See Torches, Brazing

BREAKERS, VACUUM (For Steam Using Equipment)

Bailey Co., Chas. M., San Francisco, Calif.
●Hoffman Specialty Co., Indianapolis, Ind.
McAlear Mfg. Co., Chicago, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Webster & Co., Warren, Camden, N. J.

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BRONZE VALVES

See Valves, Gate; and Valves, Globe

BUILDING INSULATION

See Insulation, Building

BURNERS, GAS, COMMERCIAL AND INDUSTRIAL

- Automatic Firing Corp., St. Louis, Mo.
- Barber Gas Burner Co., Cleveland, O.
- Barton Co., Minneapolis, Minn.
- Beck Engineering Combustion Kompany, St. Louis, Mo.
- Best Combustion Equipment Co., Inc., W. N., Carlstadt, N. J.
- Bryant Corp., C. L., Cleveland, O.
- Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
- Burdette Mfg. Co., Chicago, Ill.
- Central States Mfg. Co., Inc., Arkansas City, Kan.
- Certified Furnace Co., Div. Stainless & Steel Products Co., St. Paul, Minn.
- ●Cleaver-Brooks Co., Milwaukee, Wis.
- Coppus Engineering Corp., Worcester, Mass.
- Dalzen Mfg. Co., St. Clair, Mich.
- Eckhart Mfg. Co., Inc., Union, N. J.
- ●Eclipse Fuel Engrg. Co., Rockford, Ill.
- Engineer Co., New York, N. Y.
- ●Enterprise Engine & Machinery Co., Div. of General Metals Corp., San Francisco, Calif.
- Faber Engineering Co., Inc., Philadelphia, Pa.
- Finn Engineers, Jerry, St. Paul, Minn.
- Forney Engineering Co., Dallas, Tex.
- Fuelgaurd Co., Dallas, Tex.
- Gold Top Heating, Inc., Butte, Mont.
- Gordon & Piatt, P. O. Box 331, Winfield, Kan.
- Haney Gas Burner & Engineers, Monrovia, Calif.
- ●Iron Fireman Mfg. Co., Cleveland, O.
- ●Jackson & Church Co., Saginaw, Mich.
- Jamieson Mfg. Co., Dallas, Tex.
- Johnson Gas Appliance Co., Cedar Rapids, Ia.
- Kindl-Air Corp., Cleveland, O.
- Leahy Mfg. Co., Los Angeles, Calif.
- Lientz Co., B. P., Kansas City, Mo.
- Mahr Mfg. Co., Div., of Diamond Iron Wks., Inc., Minneapolis, Minn.
- Martin Co., Inc., J. O., San Francisco, Calif.
- ●Mettler Co., Inc., The, Los Angeles, Calif.
- Mid-Continent Metal Products Co., Chicago, Ill.
- National Airoil Burner Co., Inc., Philadelphia, Pa.
- Newcomb-Detroit Co., Detroit, Mich.
- Norman Products Co., Inc., Columbus, O.
- North American Mfg. Co., Cleveland, O.
- Peabody Engrg. Corp., New York, N. Y.
- ●Ray Oil Burner Co., San Francisco, Calif.
- ●Reinhard Brothers Co., Minneapolis, Minn.
- Roberts-Gordon Appliance Corp., Buffalo, N. Y.
- Rotary Mfg. Co., Los Angeles, Calif.
- Selas Corp. of America, Philadelphia, Pa.
- ●Sellers Engineering Co., Chicago, Ill.
- ●Siemon & Co., Kansas City, Mo.
- Sonner Burner Co., Winfield, Kan.
- Standard Fuel & Engineering Co., Detroit, Mich.
- Staples & Pfeiffer, San Francisco, Calif.
- Stout & Sons, David, St. Louis, Mo.
- ●Superior Combustion Industries, Inc., New York, N. Y.
- Surface Combustion Corp., Toledo, O.
- Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y.
- ●Webster Engineering Co., Tulsa, Okla.
- Will-Burt Co., Orrville, O.
- Zink Co., John, Tulsa, Okla.
- Zurn Mfg. Co., J. A., Industrial Div., Erie, Pa.

BURNERS, GAS AND OIL COMBINED, COMMERCIAL AND INDUSTRIAL

- Automatic Firing Corp., St. Louis, Mo.
- ●Babcock & Wilcox Co., New York, N. Y.
- Best Combustion Equipment Co., Inc., W. N., Carlstadt, N. J.
- ●Cleaver-Brooks Co., Milwaukee, Wis.
- Coppus Engineering Corp., Worcester, Mass.
- ●Eclipse Fuel Engineering Co., Rockford, Ill.
- Engineer Co., New York, N. Y.
- Enterprise Engine & Machinery Co., Div. of General Metals Corp., San Francisco, Calif.
- Faber Engineering Co., Inc., Philadelphia, Pa.
- Forney Engineering Co., Dallas, Tex.
- Haney Gas Burner & Engineers, Monrovia, Calif.
- ●Iron Fireman Mfg. Co., Cleveland, O.
- Johnson Co., S. T., Philadelphia, Pa.
- Lammert & Mann Co., Chicago, Ill.
- Leahy Mfg. Co., Los Angeles, Calif.
- Lientz Co., B. P., Kansas City, Mo.
- Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis. Minn.
- ●Mettler Co., Inc., The, Los Angeles, Calif.
- National Airoil Burner Co., Inc., Philadelphia, Pa.
- Norman Products Co., Inc., Columbus, O.
- North American Mfg. Co., Cleveland, O.
- Peabody Engineering Corp., New York, N. Y.
- Petroleum Heat & Power Co., Stamford, Conn.
- Preferred Utilities Mfg. Corp., New York, N. Y.
- Quiet Automatic Oil Burner Corp., Newark, N. J.
- ●Ray Oil Burner Co., San Francisco, Calif.
- ●Siemon & Co., Kansas City, Mo.
- Simplex Oil Heating Corp., New York, N. Y.
- Staples & Pfeiffer, San Francisco, Calif.
- ●Superior Combustion Industries, Inc., New York, N. Y.
- Surface Combustion Corp., Toledo, O.
- Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y.
- ●Webster Engineering Co., Tulsa, Okla.
- Zink Co., John, Tulsa, Okla.

BURNERS, OIL, COMMERCIAL AND INDUSTRIAL

- Ace Engineering Co., Chicago, Ill. (Rotary)
- Airtemp, Div. of Chrysler Corp., Dayton, O.
- ●Aldrich Co., Wyoming, Ill.
- American Heat Corp., Lowell, Mass. (Steam atomizing)
- Auburn Burner Co., Auburn, Ind.
- Automatic Firing Corp., St. Louis, Mo.
- ●Babcock & Wilcox Co., New York, N. Y.
- ●Best Combustion Equipment Co., Inc., W. N., Carlstadt, N. J.
- Caloroil Burner Corp., Hartford, Conn.
- Catskill Metal Works, Inc., Catskill, N. Y.
- ●Century Engrg. Corp., Cedar Rapids, Ia.
- Certified Furnace Co., Div. Stainless & Steel Products Co., St. Paul, Minn.
- Chandler Co., Cedar Rapids, Ia.
- ●Cleaver-Brooks Co., Milwaukee, Wis.
- Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
- Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
- Dalmo-Victor Co., San Carlos, Calif.
- Delco Appliance Div., General Motors Corp., Rochester, N. Y.
- Dewey-Shepard Boiler Co., Indianapolis, Ind. (high pressure)
- Diamond Iron Works, Inc., Minneapolis, Minn. (High Pressure Atomizing)
- Diesel Oil Burner Corp. of New York, Jamaica, Long Island, N. Y.
- Drying Systems, Inc., Chicago, Ill.
- Eckhart Mfg. Co., Inc., Union, N. J. (High pressure atomizing)
- Electrol Burner Mfg. Co., Inc., Rutherford, N. J.
- Engineering Co., New York, N. Y.
- Enterprise Engine & Foundry Co., San Francisco, Calif.
- Faber Engineering Co., Inc., Philadelphia, Pa.
- Forney Engineering Co., Dallas, Tex. (both steam atomizing & mechanical, high pressure)
- Fuel Savers, Inc., Harrisburg, Pa. (high pressure)
- Gilbert & Barker Mfg. Co., West Springfield, Mass.
- Hardinge Oil Burner & Mfg. Co., Chicago, Ill.
- Harvey-Whipple, Inc., Springfield, Mass.
- Hauck Mfg. Co., Brooklyn, N. Y.
- Holtum Mfg. Co., Freeport, Ill.
- ●Iron Fireman Mfg. Co., Cleveland, O. (Rotary atomizing, high pressure atomizing)
- ●Jackson & Church Co., Saginaw, Mich.
- Johnson Co., S. T., Philadelphia, Pa.
- Kleen-Heet, Inc., Chicago, Ill.
- Kol-Master Corp., Oregon, Ill. (high pressure)
- Lammert & Mann Co., Chicago, Ill.
- Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y. (horizontal rotary-belt & direct drives)
- Leahy Mfg. Co., Los Angeles, Calif.
- Lieblich Oil Burner Inc., New York, N. Y.
- Lientz Co., B. P., Kansas City, Mo. (steam atomizing)
- Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
- Malleable Iron Fittings Co., Branford, Conn. (High pressure atomizing)
- ●Mettler Co., Inc., The, Los Angeles, Calif. (high pressure atomizing and steam atomizing)
- Montag Stove & Furnace Works, Portland, Ore.
- Mt. Hawley Mfg. Co., Inc., Peoria, Ill.
- National Airoil Burner Co., Inc., Philadelphia, Pa.
- National Oil Burner Co. of N. Y. Inc., Brooklyn, N. Y. (Horizontal rotary)
- ●Norge Heat Div., Borg-Warner Corp., Detroit, Mich.
- North American Mfg. Co., Cleveland, O.
- Nu-Way Corp., The, Rock Island, Ill.
- Peabody Engrg. Corp., New York, N. Y.
- Petroleum Heat & Power Co., Stamford, Conn.
- Preferred Utilities Mfg. Corp., New York, N. Y.
- Quiet Automatic Oil Burner Corp., Newark, N. J. (high pressure atomizing)
- Radiant Utilities Corp., Brooklyn, N. Y. (high pressure)
- ●Ray Oil Burner Co., San Francisco, Calif. (High pressure atomizing rotary)
- Rayfield Co., C. L., Chicago, Ill. (Low pressure atomizing and Horizontal Rotary)
- Reif-Rexoil, Inc., Buffalo, N. Y.
- Riley Stoker Corp., Worcester, Mass.
- Rotary Mfg. Co., Los Angeles, Calif.
- Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
- Scott-Newcomb, Inc., St. Louis, Mo.
- ●Siemon & Co., Kansas City, Mo.
- Simplex Oil Heating Corp., New York, N. Y. (Low and high pressure atomizing, and horizontal rotary types)
- Staples & Pfeiffer, San Francisco, Calif. (High pressure and steam atomizing, variable capacity)
- Sun-Ray Burner Mfg. Corp., Jamaica, N. Y.
- ●Superior Combustion Industries, Inc., New York, N. Y. (rotary)
- Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y. (Variable capacity, rotary, pressure atomizing, steam atomizing)
- U. S. Machine Corp., Lebanon, Ind.
- United States Radiator Corp., Detroit, Mich.

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Vapofier Corp., Chicago, Ill. (Pre-mixed gaseous fuel generator)
●Webster Engineering Co., Tulsa, Okla.
Will-Burt Co., The, Orrville, O. (High pressure)
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
●York-Shipley, Inc., York, Pa. (Rotary, high pressure atomizing)
Zink Co., John, Tulsa, Okla.

BURNERS, PULVERIZED COAL, COMMERCIAL AND INDUSTRIAL

●Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.
Whiting Corp., Harvey, Ill.

BURNERS, PULVERIZED COAL AND GAS, COMBINED, COMMERCIAL AND INDUSTRIAL

●Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
●Foster Wheeler Corp., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.

BURNERS, PULVERIZED COAL AND OIL, COMBINED, COMMERCIAL AND INDUSTRIAL

●Babcock & Wilcox Co., New York, N. Y.
Blokolgas System, Inc., Detroit, Mich.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Engineer Co., New York, N. Y.
●Foster Wheeler Corp., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.

CALCULATORS, AIR CONDITIONING, HEATING, VENTILATING, AND PIPING; SLIDE RULE

●Calculator Specialties Co., Chicago, Ill.
Climatemaker Heat Loss Calculator Co., Bloomington, Ill.

CAPS, VENT FLUE

Accurate Sheet Metal Mfg. Works, Chicago, Ill.
Airjet Ventilator Co., Pasadena, Calif.
Breidert Co., G. C., Los Angeles, Calif.
Excelsior Steel Furnace Co., The, Chicago, Ill.
General Ceramics & Steatite Corp., Keasbey, N. J. (acid proof)
Oil Equipment Mfg. Corp., New Haven, Conn.
Penn Ventilating Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Wallace Co., William, Metalbestos Div., Belmont, Calif.

CARBON DIOXIDE ANALYZERS

See Analyzers, Carbon Dioxide, Portable

CARBON DIOXIDE INDICATORS

See Indicators, Carbon Dioxide, Boiler Room

CARBON PIPE, TUBING, FITTINGS AND VALVES

See Pipe, Tubing, Fittings and Valves, Carbon and Graphite

CAST IRON PIPE

See Pipe, Cast Iron

CEMENT AND COMPOUNDS, PIPE JOINT

Acme Refining Co., The, Cleveland, O.
Acorn Refining Co., Cleveland, O.
Akron Metallic Gasket Co., Akron, O.
Arco Co., The, Cleveland, O.
Armite Laboratories, Los Angeles, Calif.
Atlas Chemical Co., Marietta, O.
Babbitt Chemical Specialties Co., New Bedford, Mass.
Baer Bros., New York, N. Y.
Black Magic Products Co., Tulsa, Okla.
Blue Ridge Talc Co., Inc., Henry, Va.
Blue Seal Chemical Co., Roselle Park, N. J.
Bowser, Inc., Fort Wayne, Ind.
Cabot, Inc., Samuel, Boston, Mass.
Calbar Paint & Varnish Co., Philadelphia, Pa.
Chicago Gasket Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Continental Products Co., Euclid, O.
●Crane Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Croll & Son, Jesse G., Philadelphia, Pa.
Diamond Chemical Products, New York, N. Y.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Felt Products Mfg. Co., Chicago, Ill.
Flexrock Co., Philadelphia, Pa.
Garlock Packing Co., Palmyra, N. Y.
Greene, Tweed & Co., North Wales, Pa.
●Grinnell Co., Inc., Providence, R. I.
Hercules Chemical Co., Inc., New York, N. Y.
Hetzel Roofing Products Co., Newark, N. J.
Highside Chemicals Co., Clifton, N. J.
Horn Co., Inc., A. C., Long Island City, N. Y.
Illinois Oil Products, Inc., Rock Island, Ill.
Kenite Laboratory, Inc., Madison, N. J.
●Key Co., East St. Louis, Ill.
Keystone Asphalt Products Co., Chicago, Ill.
Krehbiel Co., J. H., Chicago, Ill.
Lake Chemical Co., Chicago, Ill.
Lastik Products Co., Inc., Pittsburgh, Pa.
Macksons Co., New York, N. Y.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Montgomery Bros., San Francisco, Calif.
National Engineering Products, Inc., Washington, D. C
Nebel Mfg. Co., Cleveland, O.
Oil Equipment Mfg. Corp., New Haven, Conn.
Parker Appliance Co., The, Cleveland, O.
Pecora Paint Co., Inc., Philadelphia, Pa.
Permatex Co., Inc., Brooklyn, N. Y.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Rutland Fire Clay Co., Rutland, Vt.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.
Saverite Engineering Co., Hoboken, N. J.
Schundler & Co., F. E., Long Island City, N. Y.
Smooth-On Mfg. Co., Jersey City, N. J.
Star Products Co., New York, N. Y.
Sulflo, Inc., Elizabeth, N. J.
United States Stoneware Co., New York, N. Y.
Utility Laboratory, Inc., Brooklyn, N. Y.
Wilhelm Co., A., Reading, Pa.
X Laboratories, Inc., New York, N. Y.
X-Pando Corp., Long Island City, N. Y.

CEMENT, FURNACE

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Armstrong Co., Detroit, Mich.
●Armstrong Cork Co., Lancaster, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chicago Fire Brick Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Clinton Metallic Paint Co., Clinton, N. Y. (Asbestos)
Continental Products Co., Euclid, O.
Fireline Stove & Furnace Lining Co., Chicago, Ill.
Foster Co., Benjamin, Philadelphia, Pa.
●Grant Wilson, Inc., Chicago 4, Ill.
Green Fire Brick Co., Mexico, Mo.
Hercules Chemical Co., Inc., New York, N. Y.
Johns-Manville, New York, N. Y.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Co., St. Louis, Mo.
Lastik Products Co., Inc., Pittsbrugh, Pa.
McLeod & Henry Co., Inc., Troy, N. Y.
Nebel Mfg. Co., Cleveland, O.
Pecora Paint Co., Inc., Philadelphia, Pa.
Plastic Products Co., Detroit, Mich.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Presstite Engineering Co., St. Louis, Mo.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rutland Fire Clay Co., Rutland, Vt.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sall Mountain Co., Hamilton, O.
Sauereisen Cements Co., Pittsburgh, Pa.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
Tamms Industries, Inc., Chicago, Ill.
Taylor Sons Co., Charles, Cincinnati, O.
United States Stoneware Co., New York, N. Y.
Utility Laboratory, Inc., Brooklyn, N. Y.
Walsh Refractories Corp., St. Louis, Mo.

CEMENT, INSULATING

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alton Mineral Wool Insulation Co., St. Louis, Mo.
●Armstrong Cork Co., Lancaster, Pa.
Baldwin-Hill Co., Trenton, N. J. (mineral wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bigelow-Liptak Corp., Detroit, Mich.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Carney Co., Inc., The, Mankato, Minn.
Chicago Fire Brick Co., Chicago, Ill.
Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Eagle-Picher Co., Cincinnati, O.
●Grant Wilson, Inc., Chicago, Ill.
Green Fire Brick Co., Mexico, Mo.

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International Vermiculite Co., Girard, Ill.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa. (85 per cent magnesia)
Krehbiel Co., J. H., Chicago, Ill. (Asbestos, mineral wool)
Laclede-Christy Co., St. Louis, Mo.
Moore, Inc., Goodloe E., Danville, Ill.
Mundet Cork Corp., North Bergen, N. J.
Munn and Steele, Inc., South Boston, Mass.
National Engineering Products, Inc., Washington, D. C.
National Gypsum Co., Buffalo, N. Y.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
Norristown Magnesia & Asbestos Co., Norristown, Pa.
Owens-Corning Fiberglas Corp., Toledo, O.
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Peterson Co., B. A., Dowagiac, Mich.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y.
Rutland Fire Clay Co., Rutland, Vt.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sall Mountain Co., Hamilton, O.
Sauereisen Cements Co., Pittsburgh, Pa.
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
●Union Asbestos & Rubber Co., Chicago, Ill.
United States Mineral Wool Co., South Milwaukee, Wis.
Zonolite Co., Chicago, Ill.

CENTRIFUGAL PUMPS

See Pumps, Centrifugal

CHAIN DRIVES

See Drives, Chain

CHAMBERS, COMBUSTION, PREFORMED

●Armstrong Cork Co., Lancaster, Pa.
Barclay, Inc., Robert, Chicago, Ill.
Green Fire Brick Co., Mexico, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Monogram Products Co., Inc., Philadelphia, Pa.
Oil Equipment Mfg. Corp., New Haven, Conn.
Peterson Co., B. A., Dowagiac, Mich.
Preferred Utilities Mfg. Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Stuart Supply, Des Moines, Ia.
Walsh Refractories Corp., St. Louis, Mo.

CHAMBERS, TEST, CONTROLLED TEMPERATURE AND HUMIDITY

Brandt & Co., Inc., Eugene J., New York, N. Y.
Tenney Engineering, Inc., Newark, N. J.
York Corp., York, Pa.

CHANGERS, SPEED, HYDRAULIC COUPLING

●American Blower Corp., Detroit, Mich.
CraneVeyor Corp., Los Angeles, Calif.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Link-Belt Co., Philadelphia, Pa.
Reuland Electric Co., Alhambra, Calif. (combined electric motor and fluid drive coupling)
Twin Disc Clutch Co., Rockford, Ill.

CHANGERS, SPEED, MAGNETIC

Electric Machinery Mfg. Co., Minneapolis, Minn.
Reliance Electric & Engineering Co., Cleveland, O.

CHANGERS, SPEED, MECHANICAL

Abart Gear & Machine Co., Chicago, Ill.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Doall Co., The, Des Plaines, Ill.
Dodge Mfg. Corp., Mishawaka, Ind.
Driv-Way Lite Co., Denver, Colo.
Gates Rubber Co., The, Denver, Colo.
Graham Transmissions, Inc., Milwaukee, Wis.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Lewellen Mfg. Co., Columbus, Ind.
Lima Electric Motor Co., The, Lima, O.
Link-Belt Co., Philadelphia, Pa.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Master Electric Co., Dayton, O.
Reeves Pulley Co., Columbus, Ind.
Speed Selector Inc., Cleveland, O.
Standard Transmission Equipment Co., Pasadena, Calif.
Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
●Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Wayne Manufacturing Co., Pomona, Calif.
Webster Electric Co., Racine, Wis.
White Mfg. Co., St. Paul, Minn.
Worthington Pump & Machinery Corp., Harrison, N. J.

CHECK VALVES

See Valves, Check

CHILLERS, WATER, FOR AIR CONDITIONING AND REFRIGERATION

●Acme Industries, Inc., Jackson, Mich.
Armstrong Co., Richard M., Westchester, Pa.
Baker Refrigeration Corp., South Windham, Me.
●Bell & Gossett Co., Morton Grove, Ill.
Brown Fintube Co., The, Elyria, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Dahlquist Mfg. Co. Inc., Div. of Process Engineering, Inc., Somerville, Mass.
●Davis Engineering Corp., Elizabeth, N. J.
●Dole Refrigerating Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Graham Mfg. Co., Inc., New York, N. Y.
Griscom-Russell Co., The, New York, N. Y.
Halstead & Mitchell, Pittsburgh, Pa.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Larkin Coils, Inc., Atlanta, Ga.
●McQuay, Inc., Minneapolis, Minn.
●Niagara Blower Co., New York, N. Y.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Refrigeration Economics Co., Inc., Canton, O.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sims Co., Erie, Pa.
Temprite Products Corp., Birmingham, Mich.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Vilter Mfg. Co., The, Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Whitlock Mfg. Co., Hartford, Conn.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

CIRCULATORS FOR HOT WATER HEATING SYSTEMS

Alliance Industries, Huntingdon Valley, Pa.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Baseline Mfg. Co., Minneapolis, Minn.
●Bell & Gossett Co., Morton Grove, Ill.
Columbus Steam Pump Works Co., Columbus, O.
Davidson Co., M. T., New York, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Kraissl Co., Inc., The, Hackensack, N. J.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Quality Specialty Co., Inc., Philadelphia, Pa.
Standard Electric Mfg. Co., West Berlin, N. J.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●Weil Pump Co., Chicago, Ill.
White Flomatic Corp., Hoosick Falls, N. Y.

CLAMPS, BEAM, PIPE HANGING

Carpenter & Paterson, Inc., East Boston, Mass.
Chicago Nipple Mfg. Co., Cicero, Ill.
Crawford Co., Chicago, Ill.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
●Frick Co., Waynesboro, Pa.
Gateway Engineering Co., Chicago, Ill.
Genspring, Inc., New York, N. Y.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.

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Moore, Inc., Goodloe E., Danville, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Paine Co., Chicago, Ill.
Rockwood Sprinkler Co., Worcester, Mass.
Unistrut Products Co., Chicago, Ill.
●Walworth Co., New York, N. Y.

CLAMPS, HOSE

●Crane Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Flexible Tubing Corp., Guilford, Conn.
Independent Pneumatic Tool Co., Aurora, Ill.
Marman Products Co., Inc., Inglewood, Calif.
Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Tinnerman Products, Inc., Cleveland, O.

CLAMPS, PIPE REPAIR

Altens Foundry & Machine Works, Inc., Lancaster, O.
Chelsea Metal Stamping Co., New York, N. Y.
Chicago Specialty Mfg. Co., Chicago, Ill.
Clow & Sons, James B., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Jarecki Valve Div., of H. K. Porter Co., Inc., Tulsa, Okla.
Marman Products Co., Inc., Inglewood, Calif.
Morris Coupling & Clamp Co., Ellwood City, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
●Ritter Pattern & Casting Co., Inc., New York, N. Y.
Skinner Co., M. B., South Bend, Ind.
Smooth-On Mfg. Co., Jersey City, N. J.
●Yarnall-Waring Co., Philadelphia, Pa.

CLAMPS, PIPE, WELDING

Adjustable Clamp Co., Chicago, Ill.
Detroit Stamping Co., Detroit, Mich.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Jewel Mfg. Co., St. Paul, Minn.
Trindl Products, Ltd., Chicago, Ill.
Williams & Co., J. H., Buffalo, N. Y.

CLEANERS, AIR, ELECTRICAL

Air-Maze Corp., Cleveland, O.
●American Air Filter Co., Inc., Louisville, Ky.
Lennox Furnace Co., Marshalltown, Ia.
Thermix Corp., The, Greenwich, Conn.
Trion, Inc., McKees Rocks, Pa.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

CLEANERS, TUBE

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Elliott Co., Jeannette, Pa.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Osborn Mfg. Co., Cleveland, O.
Perfection Grate & Stoker Co., Springfield, Mass.
Pierce Co., Wm. B., The, Buffalo, N. Y.
Pilley Brush Co., Fort Madison, Ia.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Spencer Turbine Co., Hartford, Conn.
Wilson, Inc., Thomas C., Long Island City, N. Y.
York Corp., York, Pa.

CLEANERS, VACUUM, FOR BOILERS

Doyle Vacuum Cleaner Co., Grand Rapids, Mich.
Ideal Industries, Inc., Sycamore, Ill.
Lamson Corp., Blower Div., Syracuse, N. Y.
Spencer Turbine Co., Hartford, Conn.

CLEANING COMPOUNDS

See Compounds, Cleaning, Pipe Coil and Condenser

CLEANING COMPOUNDS, AIR FILTER

See Compounds, Cleaning, Air Filter

CLEANING MACHINES, PIPE

See Machines, Pipe Cleaning

COAL BURNERS

See Burners, Pulverized Coal; Stokers

COAL CONVEYORS

See Conveyors, Coal and Ash

COATINGS, PROTECTIVE, FOR METALS

Alrose Chemical Co., Providence, R. I.
Amercoat Corporation, South Gate, Calif.
American Chemical Paint Co., Ambler, Pa. (rust proofing chemicals)
American Hard Rubber Co., New York, N. Y. (hard & soft rubber)
American Solder & Flux Co., Philadelphia, Pa. (Galvanizing powder)
●Armstrong Cork Co., Lancaster, Pa. (asphalt for weather & low temperatures)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y. (Pitchbase)
Bart Mfg. Co., Inc., Belleville, N. J.
Blue Ridge Talc Co., Inc., Henry, Va.
Bonafide Genasco, Inc., New York, N. Y. (asphalt)
Brooklyn Varnish Mfg. Co., Brooklyn, N. Y.
Cabot Inc., Samuel, Boston, Mass. (Bituminuous black paint)
Carey Mfg. Co., Philip, The, Lockland, Cincinnati, O. (Asphalt and aluminum paints)
Colonial Alloys Co., Metals Div., Philadelphia, Pa. (anodizing chemical oxidizing for aluminum)
Condenser Service & Engineering Co., Inc., Hoboken, N. J. (Metal spray)
Cordo Chemical Co., Norwalk, Conn.
Dampney Co., The, Boston, Mass.
Dearborn Chemical Co., Chicago, Ill. (Rust preventive)
Debevoise Co., The, Brooklyn, N. Y.
Dow Corning Corp., Midland, Mich.
du Pont de Nemours & Co. (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Eagle-Picher Co., Cincinnati, O. (Waterproof insulating, red lead and blue lead)
Flintkote Co., The, New York, N. Y. (Asphalt emulsions)
Flexrock Co., Philadelphia, Pa.
Foster Co., Benjamin, Philadelphia, Pa.
Galv-Weld Products, Lima, O. (Regalvanizing)
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O.
Haering & Co., Inc., D. W., San Antonio, Texas. (Drying and nondrying)
Hague & Co., Alfred, Brooklyn, N. Y.
Hardy, Inc., Charles, New York, N. Y. (18-8 stainless steel paste)
Heresite & Chemical Co., Manitowoc, Wis. (Synthetic)
Houghton & Co., E. F., Philadelphia, Pa.
Industrial Metal Protectives, Inc., Dayton, O.
Interchemical Corp., Finishes Div., Newark, N. J.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Kellogg Co., M. W., The, New York, N. Y. (Heat resisting)
Knight, Maurice A., Akron, O. (Vinyl plastic base)
Koppers Co., Inc., Pittsburgh, Pa. (coal tar)
Lastik Products Co., Inc., Pittsburgh, Pa.
Lithcote Corp., Chicago, Ill.
Maas & Waldstein Co., Newark, N. J.
Master Mechanics Co., Cleveland, O.
Midland Paint & Varnish Co., Cleveland, O.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
●Miracle Adhesives, Corp., New York, N. Y.
Monsanto Chemical Co., Merimac Div., Boston, Mass. (synthetics)
Mortell Co., J. W., Kankakee, Ill. (Asphalt)
National Lead Co., New York, N. Y. (Red lead)
National Pipe Coatings, Inc., Huntington Park, Calif.
Nebel Mfg. Co., Cleveland, O.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
Nooter Corp., St. Louis, Mo. (Metal spray, lead burning alloy sheet)
Oakite Products, Inc., New York, N. Y.
Ohmlac Paint & Refining Co., Inc., New York, N. Y. (Acid resistant, heat resistant)
Penn Galvanizing Co., Philadelphia, Pa. (Galvanizing)
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perolin Co., Inc., Chicago, Ill.
Pittsburgh Plate Glass Co., Pittsburgh, Pa. (Paint, varnish, lacquer)
Presstite Engineering Co., St. Louis, Mo.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Reilly Tar & Chemical Corp., Indianapolis, Ind. (Coal tar base)
●Ric-wiL Co., Cleveland, O.
Robertson Co., H. H., Pittsburgh, Pa.
●Rubber & Plastics Compound Co., New York, N. Y. (plastic waterproof paint)
Rust-Oleum Corp., Evanston, Ill.
Saran Lined Pipe Co., Ferndale, Mich.
Saverite Engineering Co., Hoboken, N. J. (Tank coatings, rust preventive)
Sherwin-Williams Co., The, Cleveland, O.
Sonneborn Sons, Inc., L., New York, N. Y.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga. (Metallic paint)
Special Chemicals Corp., New York, N. Y. (Aluminum paint)
Steelcote Mfg. Co., St. Louis, Mo.
Stewart-Warner Corp., Heating Div., Indianapolis, Ind. (ceramic)
Tropical Paint & Oil Co., Cleveland, O.
Turco Products, Inc., Los Angeles, Calif.
United Chromium, Inc., New York, N. Y. (Chemical resisting organic coating)
United States Stoneware Co., New York, N. Y. (Corrosion resistant)
Watson-Standard Co., Pittsburgh, Pa.
Wilbur & Williams Co., Brighton, Mass.
Wilhelm Co., A., Reading, Pa.
Wolfe-Kote Co., Inc., Sheboygan, Wis.
X-Pando Corp., Long Island City, N. Y. (Anti-corrosive)

COCKS, BOILER GAGE

Bordo Co., Inc., L. J., Glenside, Pa.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Keckley Co., O. C., Chicago, Ill.
Klingerit, Inc., New York, N. Y.

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Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Skokie, Ill.
Penberthy Injector Co., Detroit, Mich.
●Powell Co., Wm., The, Cincinnati, O.
Reliance Gauge Column Co., Cleveland, O.
Swift Lubricator Co., Elmira, N. Y.
Williams Gauge Co., The, Pittsburgh, Pa.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Wright-Austin Co., Detroit, Mich.

COILS

See Surface, Cooling; Surface, Heating

COILS, CONDENSATION

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●General Fittings Co., Providence, R. I.
Lewis & Co., Joseph E., Baltimore, Md.
Parker Appliance Co., The, Cleveland, O.
Yula Water Heaters, Inc., New York, N. Y.

COILS, FOR HOT WATER STORAGE TANKS

Adams Co., The, Dubuque, Ia.
American Cooling Tower Co., Kansas City, Mo.
American District Steam Co., North Tonawanda, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Davis Engineering Corp., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Everhot Products Co., Chicago, Ill.
●General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Kold-Hold Mfg. Co., Lansing, Mich.
National Pipe Bending Co., New Haven, Conn.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Quaker City Iron Wks., Philadelphia, Pa.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Sims Co., Erie, Pa.
●Taco Heaters, Inc., Providence, R. I.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

COILS AND PANELS, RADIANT HEATING AND COOLING, PREFABRICATED

●Atlantic Pipe Bending & Fabricating Corp., Edgewater, N. J.
Bradfield, Jos. L., Indianapolis, Ind. (headers)
Bruen and Sons, Robert, Oakland, Calif.
Burgess-Manning Co., Chicago, Ill. (also for radiant cooling)
Cannelton Sewer Pipe Co., RadianTile Div., Chicago, Ill. (Vitrified clay floor blocks and ducts for warm air)
Capitol Mfg. & Supply Co., Columbus, O.
Clow & Sons, James B., Chicago, Ill.
Cobra Pipe & Coil Co., Inc., Elmwood, Conn.
Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Even-Ray Co., Inc., Newark, N. J.
Fricke, Fred J., Albuquerque, N. M.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Meco, Inc., Portland, Ore.
Pan-L-Heat Corp., Portland, Ore.
Radiant Heat Engineering, Inc., Pasadena, Calif.
Radiant Panel Mfg. Co., Torrington, Conn.
Simplex Ceiling Corp., New York, N. Y.
T & H Engineering Co., Little Ferry, N. J. (hammer and holding rig for installing ceiling heating coils)

COILS, PIPE

●Acme Industries, Inc., Jackson, Mich.
American Cooling Towers Co., Kansas City, Mo.
●Atlantic Pipe Bending & Fabricating Corp., Edgewater, N. J.
B & M Mfg. Co., East Orange, N. J.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
Capitol Mfg. & Supply Co., Columbus, O.
Chicago Nipple Mfg. Co., Cicero, Ill.
Clow & Sons, James B., Chicago, Ill.
Cobra Pipe & Coil Co., Inc., Elmwood, Conn.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Crane Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y. (lead, lead covered, and lead alloy)
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
Harris & Co., Arthur, Chicago, Ill.
Kold-Hold Mfg. Co., Lansing, Mich.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Lewis & Co., Joseph E., Baltimore, Md.
Lumsden & Van Stone, Div. of Midwest Piping & Supply Co., South Boston, Mass.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
●Mueller Brass Co., Port Huron, Mich.
National Pipe Bending Co., New Haven, Conn.
Ohio Pipe Bending & Machine Co., Cleveland, O.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Radiant Heat Engineering, Inc., Pasadena, Calif.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Refrigeration Appliances, Inc., Chicago, Ill.
●Rempe Co., Chicago, Ill.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Shaw-Kendall Engineering Co., Toledo, O.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vilter Mfg. Co., The, Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Western Piping & Engineering Co., Inc., San Francisco, Calif.
Whitlock Mfg. Co., Hartford, Conn.

COLLECTION, DUST AND FUME, ULTRASONIC

Supersonics Corp. of America, New York, N. Y.
Ultrasonic Corp., Cambridge, Mass.

COLLECTORS, DUST

Aerotec Corp., The, Greenwich, Conn.
Aget-Detroit Co., Ann Arbor, Mich.
Allington & Curtis Mfg. Co., Saginaw, Mich. (centrifugal & bag)
●American Air Filter Co., Inc., Louisville, Ky.
●American Blower Corp., Detroit, Mich.
American Wheelabrator & Equiment Corp., Mishawaka, Ind.
Bartlett Hayward, Div. of Koppers Co., Inc., Baltimore, Md. (electrostatic precipitator)
Blower Application Co., Milwaukee, Wis.
Bubar Dust Systems, Inc., Old Lyme, Conn. (mechanical)
●Buffalo Forge Co., Buffalo, N. Y. (wet & dry)
Carolina Blower Co., Inc., Greensboro, N. C.
Centri-Spray Corp., Detroit, Mich. (Wet type)
●Chicago Blower Corp., Chicago, Ill. (centrifugal)
Cincinnati Electrical Tool Co., The, Cincinnati, O. (self contained)
Clark Dust Control Co., Chicago, Ill.
Columbian Steel Tank Co., Kansas City, Mo.
Day Co., The, Minneapolis, Minn.
Diamond Power Specialty Corp., Lancaster, O.
Doall Co., The, Des Plaines, Ill.
Ducon Co., Mineola, N. Y.
Dust Filter Co., Chicago, Ill.
Dust Suppression & Engineering Co., Lake Orion, Mich.
Goethel Sheet Metal Wks., Alfred, Milwaukee, Wis.
Griffin & Co., Inc., Louisville, Ky.
Ideal Industries, Inc., Sycamore, Ill.
Indiana Fan Company, Indianapolis, Ind.
Jacobs Co., B. & J., Cincinnati, O.
Kirk & Blum Mfg. Co., Cincinnati, O.
Kluegel & Co., E., St. Paul, Minn.
Lamson Corp., Blower Div., Syracuse, N. Y.
Lumm Co., A. H., Toledo, O.
Mahon Co., R. C., Detroit, Mich. (dry inertia, air washers, fog filters)
Newcomb-Detroit Co., Detroit, Mich. (recirculating water type)
Northern Blower Co., Cleveland, O.
Pangborn Corp., Hagerstown, Md. (cloth filter)
Peters-Dalton, Inc., Detroit, Mich.
●Prat-Daniel Corp., East Port Chester, Conn.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Research Corp., New York, N. Y.
Ruemelin Mfg. Co., Milwaukee, Wis.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schmieg Industries, Detroit, Mich.
Schneible Co., Claude B., Detroit, Mich.
Sly Mfg. Co., W. W., Cleveland, O.
Spencer Turbine Co., Hartford, Conn.
Sprout-Waldron & Co., Muncy, Pa.
Thermix Corp., The, Greenwich, Conn.
Torit Mfg. Co., St. Paul, Minn. (cloth filter and centrifugal separator)
Wagner Awning & Mfg. Co., Cleveland, O. (Dust recovery bags)
Western Blower Co., Seattle, Wash.
Western Precipitation Corp., Los Angeles, Calif.
Whiting Corp., Harvey, Ill.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
Young & Bertke Co., Cincinnati, O.

COLORIMETERS

Daigger & Co., A., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Photovolt Corp., New York, N. Y.
●Refinite Corp., Omaha, Neb.
Will Corp., Rochester, N .Y.

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COMBUSTION CHAMBERS

See Chambers, Combustion, Preformed

COMBUSTION CONTROL

See Controls, Draft, Barometric; Regulators, Draft, Combustion; Systems, Combustion Control

COMBUSTION RECORDERS

See Recorders, Carbon Dioxide

COMPOUNDS, AIR FRESHENING

Air-Aid Corp., New York, N. Y.
Air Vent Corp., New York, N. Y.
Airkem, Inc., New York, N. Y.
Ampion Corp., Long Island City, N. Y.
Boyle-Midway Inc., Correctair Div., New York, N. Y.

COMPOUNDS, BOILER CLEANING

Agnew & Tomlinson, Long Island City, N. Y.
American Chemical Paint Co., Ambler, Pa.
American K. A. T. Corp., Garwood, N. J.
American Sand-Banum Co., Inc., New York, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Cambridge, Mass.
Chemical Engineering Co., Dallas, Tex.
Chemical Solvent Co., Birmingham, Ala.
Continental Products Co., Euclid, O.
Dearborn Chemical Co., Chicago, Ill.
Diamond Chemical Products, New York, N. Y.
Dowell Inc., Tulsa, Okla.
Elraco Engineering Co., Los Angeles, Calif.
Ferro-Nil Corp., New York, N. Y.
Grief, Edward C., Bogota, N. J.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hagan Corp., Pittsburgh, Pa.
Hercules Chemical Co., Inc., New York, N. Y.
Hood Refining Co., Greensburg, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Kenite Laboratory, Inc., Madison, N. J.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Krehbiel Co., J. H., Chicago, Ill.
MacDermid Chemical Co., Bristol, Conn.
Madden & Co., P. E., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
North American Fibre Products Co., The, Cleveland, O.
O'Brien Industries, Caldwell, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Permutit Co., New York, N. Y.
Perolin Co., Inc., Chicago, Ill.
Radiator Specialty Co., Charlotte, N. C.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Saverite Engineering Co., Hoboken, N. J.
Squires Co., C. E., The, Cleveland, O.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Utility Laboratory, Inc., Brooklyn, N. Y.
Vinco Co., Inc., The, New York, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Water Service Laboratories, Inc., New York, N. Y.
Water Treatment Co. of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
X Laboratories, Inc., New York, N. Y.

COMPOUNDS, BOILER AND RADIATOR SEALING

Ampion Corp., Long Island City, N. Y.
Arco Co., The, Cleveland, O.
Atlas Chemical Co., Marietta, O.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Cambridge, Mass.
Chemical Solvent Co., Birmingham, Ala.
Chicago Specialty Mfg Co., Chicago, Ill.
Desolvo Co., The, Pittsburgh, Pa.
Diamond Chemical Products, New York, N. Y.
Hampton-Cross Co., The, Louisville, Ky.
Hercules Chemical Co., Inc., New York, N. Y.
Kenite Laboratory, Inc., Madison, N. J.
Krehbiel Co., J. H., Chicago, Ill.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
National Engineering Products, Inc., Washington, D. C.
Quigley Co., Inc., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Star Products Co., New York, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Utility Laboratory, Inc., Brooklyn, N. Y.
Vinco Co., Inc., The, New York, N. Y.
X Laboratories, Inc., New York, N. Y.

COMPOUNDS, CLEANING, AIR FILTER

Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
National Aniline Div., Allied Chemical & Dye Corp., New York, N. Y.
Oakite Products, Inc., New York, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Turco Products, Inc., Los Angeles, Calif.

COMPOUNDS, CLEANING, PIPE COIL AND CONDENSER

American Chemical Paint Co., Ambler, Pa.
Anderson-Stolz Corp., Kansas City, Mo.
Apex All Weather Products, Chicago, Ill.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Cambridge, Mass.
Carolina Aniline & Extract Co., Inc., Charlotte, N. C.
Chemical Engineering Co., Dallas, Tex.
Chemical Solvent Co., Birmingham, Ala.
Dearborn Chemical Co., Chicago, Ill.
Dowell, Inc., Tulsa, Okla.
Elraco Engineering Co., Los Angeles, Calif.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hercules Chemicals Co., Inc., New York, N. Y.
MacDermid Chemical Co., Bristol, Conn.
Madden & Co., P. E., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
North American Fibre Products Co., The, Cleveland, O.
Oakite Products, Inc., New York, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perolin Co., Inc., Chicago, Ill.
Radiator Specialty Co., Charlotte, N. C.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Turco Products, Inc., Los Angeles, Calif.
Water Treatment Co., of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.

COMPOUNDS, WELDING

Acme White Lead & Color Wks., Detroit, Mich.
Allen Co., Inc., L. B., Chicago, Ill.
Allied Weld-Craft, Inc., Indianapolis, Ind.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Aluminum Co. of America, Pittsburgh, Pa.
American Solder & Flux Co., Philadelphia, Pa.
Eutectic Welding Alloys Corp., New York, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Marquette Mfg. Co., Minneapolis, Minn.
Metal & Thermit Corp., New York, N. Y.
Midland Paint & Varnish Co., Cleveland, O.
Modern Engineering Co., St. Louis, Mo.
Neilson Chemical Co., Detroit, Mich.
Powder Weld Process Co., The, Brooklyn, N. Y. (Powdered)
Presstite Engineering Co., St. Louis, Mo.
Sight Feed Generator Co., West Alexandria, O.
Special Chemicals Corp., New York, N. Y.
Thompson & Co., Oakmont, Pa.
Turco Products, Inc., Los Angeles, Calif.
Wolfe-Kote Co., Inc., Sheboygan, Wis.

COMPRESSOR BASES

See Bases and Pads, Vibration Isolating

COMPRESSORS, AIR

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Beach-Russ Co., New York, N. Y.
●Binks Mfg. Co., Chicago, Ill.
●Brunner Mfg. Co., Utica, N. Y.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
Cooper-Bessemer Corp., Mt. Vernon, O.
Cooper Co., Clark, Palmyra, N. J.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Davey Compressor Co., Kent, O.
Dayton Air Compressor Co., The, Dayton, O.
DeVilbiss Co., The, Toledo, O.
Electric Sprayit Co., The, Sheboygan, Wis.
Essick Mfg. Co., Los Angeles, Calif.
Fuller Co., Catasaqua, Pa.
Gardner-Denver Co., Quincy, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gray Co., Inc., Minneapolis, Minn.
●Ingersoll-Rand Co., New York, N. Y.
●Johnson Service Co., Milwaukee, Wis.
●Joy Mfg. Co., Pittsburgh, Pa.
Lammert & Mann Co., Chicago, Ill.
Lamson Corp., Blower Div., Syracuse, N. Y.
Lynch Corp., Toledo, O.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Nash Engineering Co., South Norwalk, Conn.
North Penn Co., New York, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Schramm, Inc., West Chester, Pa.

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Spencer Turbine Co., Hartford, Conn.
Union Steam Pump Co., Battle Creek, Mich.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Wayne Pump Co., Fort Wayne, Ind.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

COMPRESSORS, REFRIGERATING, CENTRIFUGAL

●Carrier Corp., Syracuse, N. Y. (Carrene)
●Trane Co., The, LaCrosse, Wis.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

COMPRESSORS, REFRIGERATING, COMBINED WITH CONDENSER, WATER CHILLER, PIPING CONNECTIONS, AND CONTROLS

●Carrier Corp., Syracuse, N. Y.
Diceler Div. of General Machine & Mfg. Co., Berwick, Pa.
●Frick Co., Waynesboro, Pa.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.
Tecumseh Products Co., Tecumseh, Mich.

COMPRESSORS, REFRIGERATING, RECIPROCATING

Baker Refrigeration Corp., South Windham, Me. ("Freon," Methyl chloride, Ammonia)
●Brunner Mfg. Co., Utica, N. Y. (Methyl chloride, "Freon," sulphur dioxide)
●Carrier Corp., Syracuse, N. Y. ("Freon")
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O. (Radial)
Copeland Refrigeration Corp., Sidney, O.
●Curtis Refrigeration Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Deepfreeze Distributing Corp., Cincinnati, O. (low temperature industrial chilling equipment)
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Diceler Div. of General Machine & Mfg. Co., Berwick, Pa.
●Frick Co., Waynesboro, Pa. (Ammonia, "Freon")
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Machinery Co., Spokane, Wash.
Howe Ice Machine Co., Chicago, Ill. ("Freon," ammonia, methyl chloride)
●Ingersoll-Rand Co., New York, N. Y.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kelvinator Div., Nash-Kelvinator Corp., Detroit, Mich.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Lynch Corp., Toledo, O.
Mills Industries, Inc., Chicago, Ill.
Ready-Power Co., The, Detroit, Mich. (radial unit driven by direct-connected internal combustion engine)
Reliance Refrigerating Machine Co., Chicago, Ill. ("Freon," methyl chloride, ammonia)
Reynolds Mfg. Co., Inc., Springfield, Mo.
●Schnacke, Inc., Evansville, Ind.
Servel, Inc., Electric Refrigeration Div., Evansville, Ind. ("Freon")
Starr Piano Co., Richmond, Ind.
Stewart Ice Machine Co., Pomona, Calif.
Tecumseh Products Co., Tecumseh, Mich.
●Trane Co., The, LaCrosse, Wis.
Universal Cooler Div. of Newport Steel Corp., Marion, O. ("Freon")
Vilter Mfg. Co., Milwaukee, Wis. ("Freon" ammonia)
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wittenmeier Machinery Co., Chicago, Ill. (Carbon dioxide)
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill. (Ammonia, methyl chloride and "Freon")
York Corp., York, Pa. (Carbon dioxide, ammonia, "Freon")

COMPRESSORS, REFRIGERATING, STEAM JET

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engrg. Co., Inc., New York, N. Y.
Elliott Co., Jeannette, Pa.
Graham Mfg. Co., Inc., New York, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.

COMPRESSORS, STEAM BOOSTER

Bury Compressor Co., Erie, Pa.
Graham Mfg. Co.. Inc., New York, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE, INSULATING, FOR UNDERGROUND PIPING

●Zonolite Co., Chicago, Ill.

CONDENSATE DISPOSAL UNITS

See Units, Condensate Disposal

CONDENSATE RETURN

See Pumps, Condensation Return; Systems, Condensate Return

CONDENSATION METERS

See Meters, Condensation

CONDENSATION PUMPS

See Pumps, Condensation

CONDENSER TUBES

See Tubes, Condenser

CONDENSERS, REFRIGERATING, AIR COOLED

●Fedders-Quigan Corp., Buffalo, N. Y.
Heat-X-Changer Co., The, Brewster, N. Y. (1/3 hp to 5 hp)
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo. (1 to 20 tons)
Peerless of America, Inc., Chicago, Ill.

CONDENSERS, REFRIGERATING, EVAPORATIVE

●Acme Industries, Inc., Jackson, Mich.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
American Cooling Tower Co., Kansas City, Mo.
Baker Refrigeration Corp., South Windham, Me.
●Baltimore Aircoil Co., Inc., Baltimore, Md.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
●Carrier Corp., Syracuse, N. Y. ("Freon," ammonia)
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Crowell & Dunn, Inc., New York, N. Y.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
●Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
●G & O Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
●Governair Corp., Oklahoma City, Okla.
Harry Cooling Towers, Inc., New York, N. Y.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Long Mfg. Div., Borg-Warner Corp., Detroit, Mich.
●Marlo Coil Co., St. Louis, Mo.
●McQuay, Inc., Minneapolis, Minn.
Murray Mfg. Co., D. J., Wausau, Wis.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Servel, Inc., Electric Refrigeration Div., Evansville, Ind.
●Schnacke, Inc., Evansville, Ind.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
●Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
XL Refrigerating Co., Chicago, Ill.
●Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

CONDENSERS, REFRIGERATING, SHELL AND COIL

●Acme Industries, Inc., Jackson, Mich.
American Coils Co., Newark, N. J.
Armstrong Co., Richard M., Westchester, Pa.
●Autorad Inc., Chicago, Ill.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
Brown Fintube Co., The, Elyria, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
●Davis Engineering Corp., Elizabeth, N. J.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●General Fittings Co., Providence, R. I.
Halstead & Mitchell, Pittsburgh, Pa. (Double tube)
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.
Nevinger Mfg. Co., Inc., Greenville, Ill.
Nooter Corp., St. Louis, Mo.

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●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa
Refrigeration Economics Co., Inc., Canton, O.
●Rome-Turney Radiator Co., Rome, N. Y.
●Trane Co., The, LaCrosse, Wis.
●Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Whitlock Mfg. Co., Hartford, Conn.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

CONDENSERS, REFRIGERATING, SHELL AND TUBE

●Acme Industries, Inc., Jackson, Mich.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Coils Co., Newark, N. J.
Andale Co., Philadelphia, Pa.
●Autorad Inc., Chicago, Ill.
Armstrong Co., Richard M., Westchester, Pa.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
●Bell & Gossett Co., Morton Grove, Ill.
Biggs Boiler Works Co., E., Akron, O.
Brown Fintube Co., The, Elyria, O.
●Carrier Corp., Syracuse, N. Y. (Carrene)
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Kramer Trenton Co., Trenton, N. J.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
National Radiator Co., The, Johnstown, Pa.
Nevinger Mfg. Co., Inc., Greenville, Ill.
Nooter Corp., St. Louis, Mo.
Ohio Pipe Bending & Machine Co., Cleveland, O.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa
Refrigeration Economics Co., Inc., Canton, O.
Reliance Refrigerating Machine Co., Chicago, Ill.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Richmond Engrg. Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
●Rome-Turney Radiator Co., Rome, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Schnacke, Inc., Evansville, Ind.
Stewart Ice Machine Co., Pomona, Calif.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Union Steam Pump Co., Battle Creek, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Whitlock Mfg. Co., Hartford, Conn.
Wittenmeier Machinery Co., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

CONDENSERS, WATER DISTRIBUTORS FOR

See Distributors, Water, for Condensers

CONDENSING UNITS

See Compressors

CONDUCTORS AND PANELS, ELECTRICAL, FOR RADIANT HEATING

●Appleman Glass Works, Bergenfield, N. J.
Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Electradiant Corp., Monterey, Calif.
Roberson Co., L. N., Seattle, Wash.
United States Rubber Co., New York, N. Y.
Wiegand Co., Edwin L., Pittsburgh, Pa.

CONDUIT, UNDERGROUND PIPING

American District Steam Co., North Tonawanda, N. Y.
Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Dockstader, Inc., S. E., Washington, D. C.
●Durant Insulated Pipe Co., Palo Alto, Calif.
Johns-Manville, New York, N. Y.
Kaiser Co., E. B., Chicago, Ill.
Michigan Pipe Co., Bay City, Mich.
Orangeburg Mfg. Co., Orangeburg, N. Y.
●Porter & Co., Inc., H. W., Newark, N. J.
●Ric-wiL Co., Cleveland, O.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Stillwater Clay Products Co., The, Cleveland, O.
Water Tight Underground Conduit, Houston, Tex.

CONNECTIONS, DUCT, FLEXIBLE (ASBESTOS, CANVAS, ETC.)

Canvas Products Co., St. Louis, Mo.
Chicago Metal Hose Corp., Maywood, Ill.
Felters Company, The, Boston, Mass.
●Grant Wilson Inc., Chicago, Ill.
Iden Associates, Chicago, Ill.
Polyken Industrial Tape Dept., Bauer & Black, Div. of the Kendall Co., Chicago, Ill.
St. Clair Rubber Co., Detroit, Mich.
United States Rubber Co., New York, N. Y.
Wagner Awning & Mfg. Co., Cleveland, O.

CONNECTORS, FILLING, HYDROSTATIC TEST

Mechanical Products Corp., Chicago, Ill.
Roylyn, Inc., Glendale, Calif.

CONNECTORS, FOR NON-METALLIC DUCT FABRICATION

Acme Steel Co., Chicago, Ill. (Strapping)
Klomparens Lock-Joint Mfg. Co., Inc., Washington, D. C.
Lumm Co., A. H., Toledo, O.
Sheetlock Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.

CONTINUOUS HEATERS

See Heaters, Steam Jet, for Liquids

CONTROL, FOR INDIRECT WATER HEATERS

Barber-Colman Co., Rockford, Ill.
●Bell & Gossett Co., Morton Grove, Ill.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
●Hoffman Specialty Co., Indianapolis, Ind.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
Watts Regulator Co., Lawrence, Mass.

CONTROL SYSTEMS, PRE-ASSEMBLED AS UNITS, FOR HEATING, COOLING AND VENTILATING

Factory Assemblies Using Other Manufacturers' Valves, Thermostats, Damper Motors, etc.

American Moistening Co., Providence, R. I.
Bahnson Co., Winston-Salem, N. C.
Dunham Co., C. A., Chicago, Ill.
●Illinois Engineering Co., Chicago, Ill.
Master Control Co., Akron, O.
Midwest Automatic Control Co., Des Moines, Ia.

CONTROLLERS AND STARTERS, MOTOR

●Allen-Bradley Co., Milwaukee, Wis.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
B/W Controller Corp., Birmingham, Mich.
Borg-Erickson Corp., Chicago, Ill.
Chase-Shawmut Co., Newburyport, Mass.
Clark Controller Co., Cleveland, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Electric Machinery Mfg. Co., Minneapolis, Minn. (Synchronous motor)
Fitch, Allen & Co., Chicago, Ill.
Furnas Electric Co., Batavia, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Ideal Electric & Mfg. Co., Mansfield, O.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Monitor Controller Co., The, Boston, Mass.
●Penn Controls, Inc., Goshen, Ind.
Redmond Co., Inc., Owosso, Mich.
Reynolds Electric Co., River Grove, Ill.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.

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Trumbull Dept., General Electric Co., Plainville, Conn.
●Ward Leonard Electric Co., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.
Zenith Electric Co., Chicago, Ill.

CONTROLS, AIR CONDITIONING

See Humidistats; Indicator-Controllers; Operators, Damper; Operators, Valve; Recorder-Controllers; Regulators; Relays; Switches; Thermostats; Valves, Diaphragm; Valves, Refrigeration; Valves, Solenoid

CONTROLS, DOOR, ELECTRIC EYE (FOR AIR CONDITIONED ROOMS)

De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Ess Specialty Corp., Bergenfield, N. J.
Stanley Works, The, New Britain, Conn.
Westinghouse Electric Corp., Pittsburgh, Pa.

CONTROLS, DRAFT, BAROMETRIC

A-P Controls Corp., Milwaukee, Wis.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Campbell Engineering Co., Appleton, Wis.
Cleveland Fuel Equipment Co., Cleveland, O.
Cole-Sewell Engineering Co., St. Paul, Minn.
Empire Ventilation Equipment Co., Long Island City, N. Y.
●Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Fuelguard Co., Dallas, Tex.
Hotstream Heater Co., Cleveland, O.
Krueger Sentry Gauge Co., Green Bay, Wis.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Salina Metal Products Co., Salina, Kan.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Mfg. Co., Fond du Lac, Wis.

CONTROLS, FIRE PROTECTION SPRINKLER SYSTEMS

American District Telegraph Co., New York, N. Y.
●Automatic Products Co., Milwaukee, Wis.
Barber-Colman Co., Rockford, Ill.
Clark Controller Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.
Synchro-Start Products, Inc., Chicago, Ill.
Worner Electronic Devices, Rankin, Ill.

CONTROLS, FLAME FAILURE

American District Telegraph Co., New York, N. Y.
Bristol Co., The, Waterbury, Conn.
●Combustion Control Corp., Cambridge, Mass.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Drying Systems, Inc., Chicago, Ill.
Ess Specialty Corp., Bergenfield, N. J.
Fuelguard Co., Dallas, Tex.
●General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Haney Gas Burner & Engrs., Monrovia, Calif.
●Mercoid Corp., The, Chicago, Ill.
●Mettler Co., Inc., The, Los Angeles, Calif.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
●Webster Engineering Co., Tulsa, Okla.
Wheelco Instruments Co., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.

CONTROLS, HEATING

See Alarms; Humidistats; Indicator-Controllers; Operators, Damper; Operators, Valve; Recorder-Controllers; Regulators; Relays; Switches; Systems, Combustion Control; Systems, Heating; Thermostats; Valves, Balancing, Radiator; Valves, Diaphragm; Valves, Flow Control; Valves, Mixing; Valves, Pressure Reducing and Regulating; Valves, Radiator; Valves, Solenoid

CONTROLS, PUSH-PULL

See Shafts, Flexible, Push-Pull, for Control

CONTROLS, REFRIGERATION

See Humidistats; Operators, Valve; Relays; Switches; Thermostats; Valves, Refrigeration; Valves, Solenoid

CONVECTORS

See Radiation, Convection Type

CONVECTORS, STEAM

Bell & Gossett Co., Morton Grove, Ill.

CONVEYORS, COAL AND ASH

Ajax Flexible Coupling Co., Westfield, N. Y.
American Coal Burner Co., Chicago, Ill.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Chain Belt Co., Milwaukee, Wis.
Chicago Fire Brick Co., Chicago, Ill.
CraneVeyor Corp., Los Angeles, Calif.
Farquhar Co., A. B., York, Pa.
Hager Bros., Rockford, Ill.
Jeffrey Mfg. Co., Columbus, O.
●Joy Mfg. Co., Pittsburgh, Pa.
Link-Belt Co., Chicago, Ill.
Sprout, Waldron & Co., Muncy, Pa.
Standard Transmission Equipment Co., Pasadena, Calif.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Whitty Co., Inc., Boston, Mass.

COOLERS, CRANE CAB

●Dravo Corp., Pittsburgh, Pa.
●Trane Co., The, LaCrosse, Wis.

COOLERS, EVAPORATIVE

See Units, Air Conditioning, Summer, Evaporative Cooling Type

COOLERS, OIL

American Cooling Tower Co., Kansas City, Mo.
American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Andale Co., Philadelphia, Pa.
Armstrong Co., Richard M., Westchester, Pa.
●Bell & Gossett Co., Morton Grove, Ill.
Brown Fintube Co., The, Elyria, O.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Fluor Corp., Ltd., The, Los Angeles, Calif.
●G & O Mfg. Co., New Haven, Conn.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gilbert Brass Foundry Co., St. Louis, Mo.
Graham Mfg. Co., Inc., New York, N. Y.
Griscom-Russell Co., The, New York, N. Y.
Halstead & Mitchell, Pittsburgh, Pa.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Kold-Hold Mfg. Co., Lansing, Mich.
●Marlo Coil Co., St. Louis, Mo.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
National Pipe Bending Co., New Haven, Conn.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
●Perfex Corp., Milwaukee, Wis.
Refrigeration Economics Co., Inc., Canton, O.
Reliable Products Mfg. Co., Brooklyn, N. Y.
●Rome-Turney Radiator Co., Rome, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Sims Co., Erie, Pa.
●Struthers Wells Corp., Titusville, Pa.
Superior Combustion Industries, Inc., New York, N. Y.
●Taco Heaters, Inc., Providence, R. I.
Temprite Products Corp., Birmingham, Mich.
●Trane Co., The, LaCrosse, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Whitlock Mfg. Co., Hartford, Conn.
Williams Co., Inc., B. S., Mt. Vernon, N. Y.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

COOLERS, UNIT (FLOOR TYPE)

Not air conditioning units, but floor mounted unit with coil and centrifugal fans without filters, for connection to remote compressor or cold water supply. For air conditioning units see Units, Air Conditioning

●Acme Industries, Inc., Jackson, Mich.
●American Blower Corp., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
●Baltimore Aircoil Co., Inc., Baltimore, Md.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.

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- ●Carrier Corp., Syracuse, N. Y.
- Conditionaire Unit Co., Chicago, Ill.
- ●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
- Drayer & Hanson, Inc., Los Angeles, Calif.
- Economy Equipment Co., Chicago, Ill.
- ●Frick Co., Waynesboro, Pa.
- ●Governair Corp., Oklahoma City, Okla.
- Howe Ice Machine Co., Chicago, Ill.
- Industrial Mfg. & Engineering Co., Chicago, Ill.
- Kauffman Air Conditioning Corp., St. Louis, Mo.
- ●Kennard Corp., St. Louis, Mo.
- King Co., The, Owatonna, Minn.
- Larkin Coils, Inc., Atlanta, Ga.
- ●Marlo Coil Co., St. Louis, Mo.
- ●McQuay, Inc., Minneapolis, Minn.
- Modine Mfg. Co., Racine, Wis.
- Murray Mfg. Co., D. J., Wausau, Wis.
- ●Niagara Blower Co., New York, N. Y.
- Refrigeration Appliances, Inc., Chicago, Ill.
- Refrigeration Economics Co., Inc., Canton, O.
- Refrigeration Engineering, Inc., Los Angeles, Calif.
- Rigidbilt Inc., Chicago, Ill.
- Rinehart Inc., Richmond, Ind.
- St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
- Tenney Engineering, Inc., Newark, N. J.
- ●Trane Co., The, La Crosse, Wis.
- ●United States Air Conditioning Corp., Minneapolis, Minn.
- Vilter Mfg. Co., Milwaukee, Wis.
- ●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
- ●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
- X L Refrigerating Co., Chicago, Ill.
- York Corp., York, Pa.

COOLERS, UNIT (SUSPENDED TYPE)

Not air conditioning units, but suspended unit with coil and propeller fan, without filters, for connection to remote compressor or cold water supply. For air conditioning units, see Units, Air Conditioning

- ●American Blower Corp., Detroit, Mich.
- American Coils Co., Newark, N. J.
- American Cooling Tower Co., Kansas City, Mo.
- Auburn Burner Co., Auburn, Ind.
- Baker Refrigeration Corp., South Windham, Me.
- Betz Corp., Hammond, Ind.
- ●Buffalo Forge Co., Buffalo, N. Y.
- ●Bush Mfg. Co., West Hartford, Conn.
- ●Carrier Corp., Syracuse, N. Y.
- Conditionaire Unit Co., Chicago, Ill.
- ●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
- Drayer & Hanson, Inc., Los Angeles, Calif.
- Economy Equipment Co., Chicago, Ill.
- ●Fedders-Quigan Corp., Buffalo, N. Y.
- Frigidaire Div., General Motors Corp., Dayton, O.
- General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
- ●Governair Corp., Oklahoma City, Okla.
- Howe Ice Machine Co., Chicago, Ill.
- Industrial Mfg. & Engineering Co., Chicago, Ill.
- Kauffman Air Conditioning Corp., St. Louis, Mo.
- ●Kennard Corp., St. Louis, Mo.
- King Co., The, Owatonna, Minn.
- ●Kramer Trenton Co., Trenton, N. J.
- Larkin Coils, Inc., Atlanta, Ga.
- Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
- ●Marlo Coil Co., St. Louis, Mo.
- ●McQuay, Inc., Minneapolis, Minn.
- Merchant & Evans Co., Philadelphia, Pa.
- Murray Mfg. Co., D. J., Wausau, Wis.
- ●Niagara Blower Co., New York, N. Y.
- Peerless of America, Inc., Chicago, Ill.
- Refrigeration Appliances, Inc., Chicago, Ill.
- Refrigeration Economics Co., Inc., Canton, O.
- Refrigeration Engineering, Inc., Los Angeles, Calif.
- ●Rempe Co., Chicago, Ill.
- Rigidbilt Inc., Chicago, Ill.
- Rinehart Inc., Richmond, Ind.
- St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
- Tenney Engineering, Inc., Newark, N. J.
- ●Trane Co., The, La Crosse, Wis.
- ●United States Air Conditioning Corp., Minneapolis, Minn.
- Vilter Mfg. Co., Milwaukee, Wis.
- ●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
- Wilson Engineering Corp., Chicago, Ill.
- ●Wing Mfg. Co., L. J., Linden, N. J.
- ●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
- X L Refrigerating Co., Chicago, Ill.
- York Corp., York, Pa.

COOLING COILS

See Surface, Cooling

COOLING SURFACE

See Surface, Cooling

COOLING TOWERS

See Towers, Cooling

COOLING UNITS

See Units, Air Conditioning; Coolers, Unit

COPPER PIPE

See Pipe, Brass and Copper

COPPER SHEETS

See Sheets, Copper

COPPER TUBE FITTINGS

See Fittings, Copper Tube

COPPER TUBE FITTINGS, FLARED

See Fittings, Copper Tube, Flared

COPPER TUBING

See Tubing, Brass and Copper

CORROSION PREVENTIVES

See Devices, Electrolytic, for Preventing Corrosion; Treatment, Steam System, to Inhibit Corrosion; and Treatment, Water, to Inhibit Corrosion

COUNTERS, DUST

- Bausch & Lomb Optical Co., Rochester, N. Y.
- Hill, E. Vernon & Co., Chicago, Ill.
- Mine Safety Appliances Co., Pittsburgh, Pa.
- Service to Industry, West Hartford, Conn.
- Willson Products, Inc., Reading, Pa.

COUPLINGS, FLEXIBLE, POWER TRANSMISSION

- Ajax Flexible Coupling Co., Westfield, N. Y.
- American Flexible Coupling Co., Erie, Pa.
- Blood Brothers Machine Co., Allegan, Mich. (Universal joints)
- Boston Gear Wks., Inc., North Quincy, Mass.
- Brooks Equipment Corp., Hoboken, N. J.
- Browning Mfg. Co., Inc., Maysville, Ky.
- Caldwell Co., W. E., Louisville, Ky.
- Central Die Casting & Mfg. Co., Inc., Chicago. Ill.
- Certified Flexible Couplings, New York, N. Y.
- Chain Belt Co., Milwaukee, Wis.
- Chicago Die Casting Mfg. Co., Chicago, Ill.
- Climax Metal Products Co., Cleveland, O.
- Congress Drives Div., Tann Corp., Detroit, Mich.
- Crocker-Wheeler Div. Elliott Co., Ampere, N. J.
- Davidson Co., M. T., New York, N. Y.
- ●De Laval Steam Turbine Co., Trenton, N. J.
- Diamond Chain Co., Inc., Indianapolis, Ind.
- Falk Corp., Milwaukee, Wis.
- Guardian Products Corp., Michigan City, Ind.
- Jeffrey Mfg. Co., Columbus, O.
- Jones Foundry & Machine Co., W. A., Chicago, Ill.
- Koppers Co., Inc., Pittsburgh, Pa.
- Link-Belt Co., Indianapolis, Ind.
- Lord Mfg. Co., Erie, Pa.
- Lovejoy Flexible Coupling Co., Chicago, Ill.
- Medart Co., St. Louis, Mo.
- Mercury Clutch Div., Automatic Steel Products, Inc., Canton, O. (automatic centrifugal clutch)
- Morse Chain Co., Detroit, Mich.
- Philadelphia Gear Works, Inc., Philadelphia, Pa.
- Piezo Mfg. Corp., New York, N. Y.
- Poole Foundry & Machine Co., Baltimore, Md.
- Ramsey Chain Co., Inc., Albany, N. Y.
- Royersford Foundry & Machine Co., Inc., Royersford, Pa.
- Shallcross Co., Philadelphia, Pa.
- Smith & Serrell, Inc., Newark, N. J.
- Sprout, Waldron & Co., Muncy, Pa.
- Stow Mfg. Co., Binghamton, N. Y.
- Thermoid Co., Trenton, N. J.
- United States Rubber Co., New York, N. Y.
- ●Waldron Corp., John, New Brunswick, N. J.
- Westinghouse Electric Corp., Pittsburgh, Pa.
- Whitney Chain Co., Hartford, Conn.
- Wood's Sons Co., T. B., Chambersburg, Pa.
- Zurn Mfg. Co., J. A., Erie, Pa.

COUPLINGS, PIPE

- Aero-Coupling Corp., Burbank, Calif.
- Aeroquip Corp., Jackson, Mich.
- Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
- Camco Products Inc., New Haven, Conn.
- Capitol Mfg. & Supply Co., Columbus, O.
- Champion Machine & Forging Co., Cleveland, O.
- ●Chase Brass & Copper Co., Waterbury, Conn.
- Clow & Sons, James B., Chicago, Ill.
- Continental-Diamond Fibre Co., Newark, Del.
- Cooper-Alloy Foundry Co., The, Hillside, N. J.
- ●Crane Co., Chicago, Ill.
- Detroit Brass & Malleable Works, Detroit, Mich.
- Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
- Drinkwater, Inc., Waukegan, Ill.
- Fischer & Porter Co., Hatboro, Pa. (glass)
- Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
- Flori Pipe Co., The, St. Louis, Mo.

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●Frick Co., Waynesboro, Pa.
Gilbert Brass Foundry Co., St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Gustin-Bacon Mfg. Co., Kansas City, Mo.
Harrisburg Steel Corp., Harrisburg, Pa.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
King Union Co., Inc., Hillsgrove, R. I.
●Ladish Co., Cudahy, Wis.
Malleable Iron Fittings Co., Branford, Conn.
Marman Products Co., Inc., Inglewood, Calif.
Morris Coupling & Clamp Co., Ellwood City, Pa.
●Mueller Brass Co., Port Huron, Mich.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Rhode Island Fittings Co., Providence, R. I.
Semler Co., Jeannette, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Stokes Molded Products, Inc., Trenton, N. J. (Hard rubber)
Tube Turns, Inc., Louisville, Ky. (welding couplings)
Union Metal Works, Chelsea, Mass.
United States Stoneware Co., New York, N. Y.
Victaulic Co. of America, New York, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
The E. H. Wachs Co., Chicago, Ill.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Weatherhead Co., The, Cleveland, O.
Wheeling Machine Products Co., Wheeling, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

COUPLINGS, PIPE, DETACHABLE

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
Crabb Engineering Co., Detroit, Mich.
Drinkwater, Inc., Waukegan, Ill.
Gates Engineering Co., Wilmington, Del.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Morris Coupling & Clamp Co., Ellwood City, Pa.
Roylyn, Inc., Glendale, Calif.
Victaulic Co. of America, New York, N. Y.
Wiggins Oil Tool Co., Inc., E. B., Los Angeles, Calif.

CRANE CAB COOLERS

See Coolers, Crane Cab

CUT-OFFS, LOW WATER, HEATING BOILER

B/W Controller Corp., Birmingham, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●General Controls Co., Glendale, Calif.
Johnson Corp., The, Three Rivers, Mich.
Magnetrol, Inc., Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
●Penn Controls, Inc., Goshen, Ind.
Schaub Engineering Co., Fred H., Chicago, Ill.
Watts Regulator Co., Lawrence, Mass.
●Webster & Co., Warren, Camden, N. J.

CUTTERS, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Atkins & Co., E. C., Indianapolis, Ind.
Barnes Tool Co., The, New Haven, Conn.
Beaver Pipe Tools, Inc., Warren, O.
Bernz Co., Otto, Rochester, N. Y.
Capewell Mfg. Co., Hartford, Conn.
Continental Machine Co., Chicago, Ill.
Crown Die & Tool Co., Chicago, Ill.
Erie Tool Works, Erie, Pa.
Hollands Mfg. Co., Erie, Pa.
Landis Machine Co., Inc., Waynesboro, Pa.
M-M-A, Inc., Lancaster, Pa.
Nye Tool Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
Quijada Tool Co., Inc., Los Angeles, Calif.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Saunders Mfg. Co., Yonkers, N. Y.
Toledo Pipe Threading Machine Co., Toledo, O.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Wachs Co., E. H., The, Chicago, Ill. (pipe saw)

CUTTERS, TUBING

Armstrong Bros. Tool Co., Chicago, Ill.
Bernz Co., Otto, Rochester, N. Y.
●Bonney Forge & Tool Works, Allentown, Pa.
Capewell Mfg. Co., Hartford, Conn.
●Chase Brass & Copper Co., Waterbury, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Continental Machine Co., Chicago, Ill.
Couplings Co., Chicago, Ill.
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Landis Machine Co., Inc., Waynesboro, Pa.
●Mueller Brass Co., Port Huron, Mich.
Nye Tool Co., Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Penn Brass & Copper Co., Erie, Pa.
Quijada Tool Co., Inc., Los Angeles, Calif.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Weatherhead Co., Cleveland, O.

DAMPER OPERATORS

See Operators, Damper

DAMPER REGULATORS

See Regulators, Damper Sets

DAMPERS, DUCT, MANUALLY OPERATED

Acme Mfg. Co., Holmesburg, Philadelphia, Pa.
Adams Co., The, Dubuque, Ia.
Air Control Products, Inc., Coopersville, Mich.
●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
Controlair Mfg. Co., Los Angeles, Calif.
Corbman Bros., Inc., Philadelphia, Pa.
Elgo Shutter & Mfg. Co., Detroit, Mich.
Excelsior Steel Furnace Co., Chicago, Ill.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Hart & Cooley Mfg. Co., Holland, Mich.
Inland Steel Products Co., Milwaukee, Wis.
Jacobs Co., B. & J., Cincinnati, O.
Kerentoff, G. L., Cincinnati, O.
Martens & Stormoen, Boston, Mass.
Meyer Mfg. Co., Detroit, Mich.
Salina Metal Products Co., Salina, Kan.
Sioux Steel Co., Sioux Falls, S. D.
Standard Furnace Supply Co., Omaha, Neb.
●Titus Mfg. Corp., Waterloo, Ia.
Thermix Corp., The, Greenwich, Conn.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Register Co., Battle Creek, Mich.
Young Regulator Co., Cleveland, O.

DAMPERS, DUCT, REMOTE CONTROLLED

●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
●Anemostat Corp. of America, New York, N. Y.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Buensod-Stacey, Inc., New York, N. Y.
Conoflow Corp., Philadelphia, Pa.
Controlair Mfg. Co., Los Angeles, Calif.
●Johnson Service Co., Milwaukee, Wis.
Meyer Mfg. Co., Detroit, Mich.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Skokie, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.
●Tuttle & Bailey, Inc., New Britain, Conn.
Vapor Heating Corp., Chicago, Ill.
Young Regulator Co., Cleveland, O.

DAMPERS, PULSATION, FOR PIPING SYSTEMS

Campbell Co., J. A., Long Beach, Calif.
Greer Hydraulics, Inc., Brooklyn, N. Y.
●Industrial Acoustics Co., New York, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.

DEAERATORS

American Water Softener Co., Philadelphia, Pa.
Buflovac Equipment Div. of Blaw-Knox Co., Buffalo, N. Y.
Cochrane Corp., Philadelphia, Pa.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engrg. Co., Inc., New York, N. Y.
Elliott Co., Jeannette, Pa.

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Fluor Corp., Ltd., The, Los Angeles, Calif.
General Heaters & Regulators Co., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Graver Water Conditioning Co., New York, N. Y.
Hoppes Mfg. Co., Inc., Springfield, O.
Permutit Co., New York, N. Y.
●Refinite Corp., Omaha, Neb.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
●Swartwout Co., Cleveland, O.
Whitlock Mfg. Co., Hartford, Conn.
Worthington Pump & Machinery Corp., Harrison, N. J.

DEEP WELL PUMPS

See Pumps, Deep Well

DEHUMIDIFIERS, ABSORPTION AND ADSORPTION

Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
Cargocaire Engineering Corp., New York, N. Y. (for ships)
●Carrier Corp., Syracuse, N. Y.
Daly, Merritt & Sullivan, Inc., Falls Church, Va.
Dow Chemical Co., The, Midland, Mich.
Drying Systems, Inc., Chicago, Ill.
Dryomatic Corp. of America, Baltimore, Md.
Floridin Co., Warren, Pa.
Kaufman Co., H. J., Detroit, Mich.
●Niagara Industrial Corp., New York, N. Y.
Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Selas Corp. of America, Philadelphia, Pa.
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Solvay Sales Div., Allied Chemical & Dye Corp., New York, N. Y.
Somers, Inc., H. J., Detroit, Mich.
●Surface Combustion Corp., Toledo, O.
Tamms Industries, Inc., Chicago, Ill.

DEHUMIDIFIERS, ELECTRIC PLUG-IN, FOR SMALL SPACES

Aqua-Sorb Co., East Orange, N. J.
Cargocaire Engineering Corp., New York, N. Y.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Dryomatic Corp. of America, Baltimore, Md.
Ebco Mfg. Co., Columbus, O.
●Fedders-Quigan Corp., Buffalo, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
Haertel Co., Walter, Minneapolis, Minn.
Kauffman Air Conditioning Co., St. Louis, Mo.
Mitchell Mfg. Co., Chicago, Ill.
Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
Sterling Air Conditioning Corp., Washington, D. C.
●United States Air Conditioning Corp., Minneapolis, Minn.

DEHUMIDIFIERS, SPRAY

See Washers, Air

DEHUMIDIFYING UNITS

See Units, Air Conditioning; Dehumidifiers, Absorption and Adsorption

DEHYDRANT AND ACID NEUTRALIZER, FOR REFRIGERATING SYSTEMS

Highside Chemicals Co., Clifton, N. J.
●Mueller Brass Co., Port Huron, Mich.
Selas Corp. of America, Philadelphia, Pa.

DEHYDRATORS, REFRIGERANT

A-P Controls Corp., Milwaukee, Wis.
Aluminum Co. of America, Pittsburgh, Pa.
Aminco Refrigeration Products Co., Detroit, Mich.
Cee-Kleer Products Co., Cincinnati, O.
Eagle Chemical Co., Inc., Joliet, Ill.
Floridin Co., Warren, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Madden Brass Products Co., The, Chicago, Ill.
McIntire Connector Co., Newark, N. J.
●Mueller Brass Co., Port Huron, Mich.
Remco, Inc., Zelienople, Pa.
Selas Corp. of America, Philadelphia, Pa.
●Sporlan Valve Co., St. Louis, Mo.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Wabash Mfg. Co., Chicago, Ill.

DESTROYERS, SOOT, CHEMICAL

Allen Co., Robert G., Mechanicsville, N. Y.
Ampion Corp., Long Island City, N. Y.
Bird-Archer Co., Philadelphia, Pa.
Coughlan Co., G. N., West Orange, N. J.
Desolvo Co., The, Pittsburgh, Pa.
Diamond Chemical Products, New York, N. Y.
Healy Ruff Co., St. Paul, Minn.
Hercules Chemical Co., Inc., New York, N. Y.
Kenite Laboratory, Inc., Madison, N. J.
MacDermid Chemical Co., Bristol, Conn.
Madden & Co., P. E., Chicago, Ill.
National Aluminate Corp., Chicago, Ill.
Nutmeg Chemical Co., New Haven, Conn.
O'Brien Industries, Caldwell, N. J.
Perolin Co., Inc., Chicago, Ill.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Saverite Engineering Co., Hoboken, N. J.
Tamms Industries, Inc., Chicago, Ill.
Vinco Co., Inc., The, New York, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Western Chemical Co., Kansas City, Mo.

DESUPERHEATERS, STEAM

●Babcock & Wilcox Co., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Brown Fintube Co., The, Elyria, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Foster Wheeler Corp., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Spence Engineering Co., Inc., Walden, N. Y.
Springfield Boiler Co., Springfield, Ill.
Whitlock Mfg. Co., Hartford, Conn.

DETECTORS, LEAK, REFRIGERANT

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Gates & Co., Inc., George W., Franklin Sq., L. I., N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Goss Gas, Inc., Pittsburgh, Pa.
Highside Chemicals Co., Clifton, N. J.
Justrite Mfg. Co., Chicago, Ill.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Turco Products, Inc., Los Angeles, Calif.
Turner Brass Wks., Sycamore, Ill.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.

DETECTORS, LEAK, UNDERGROUND PIPING

Fisher Research Laboratory, Inc., Palo Alto, Calif.
Radioactive Products, Inc., Detroit, Mich.
Wilkinson Products Co., Pasadena, Calif.

DEVICES, ELECTROLYTIC, FOR PREVENTING CORROSION

Aqua Electric Scale Control, Inc., Cleveland, O.
Brown Electro Co., Oklahoma City, Okla.
Electro Rust-Proofing Corp., Belleville, N. J.
Magnode Products, Inc., Brooklyn, N. Y.
McRay Products Co., South Pasadena, Calif.
Rotometals, Inc., San Francisco, Calif.
Wallace & Tiernan Co., Inc., Newark, N. J.

DEW POINT INDICATORS

See Indicators, Dew Point

DIAPHRAGM VALVES

See Valves, Diaphragm

DIESEL ENGINES

See Engines, Diesel, for Fan, Pump and Compressor Drives

DIFFUSERS, AIR, HIGH VELOCITY

See also Grilles; Panels, Perforated, for Air Diffusion; Registers

●A-J Mfg. Co., Kansas City, Mo.
Air Control Products, Inc., Coopersville, Mich.
●Air Devices, Inc., New York, N. Y.
Aladdin Heating Corp., Oakland, Calif.
●Anemostat Corp. of America, New York, N. Y.
Barber-Colman Co., Rockford, Ill.
●Connor Engineering Corp., W. B., Danbury, Conn.
Demuth & Sons, Charles, Mineola, L. I., N. Y.
Hart & Cooley Mfg. Co., Holland, Mich.
●Titus Mfg. Corp., Waterloo, Ia.
●Tuttle & Bailey, Inc., New Britain, Conn.
●Universal Diffuser Corp., New York, N. Y.

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DIFFUSION, AIR

See Panels, Perforated, for Air Diffusion

DISTRIBUTORS, WATER, FOR CONDENSERS

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Martocello & Co., Jos. A., Philadelphia, Pa.
York Corp., York, Pa.

DOOR CONTROLS

See Controls, Door, Electric Eye

DOORS AND PANELS, ACCESS

Adams Co., The, Dubuque, Ia.
●Air & Refrigeration Corp., New York, N. Y.
American Foundry & Furnace Co., Bloomington, Ill.
American Sheet Metal Works, New Orleans, La.
●Auer Register Co., Cleveland, O.
Biersach & Niedermeyer Co., Milwaukee, Wis.
Camloc Fastener Corp., New York, N. Y. (Fasteners for)
Canton Stoker Corp., Canton, O.
●Clarage Fan Co., Kalamazoo, Mich.
Decatur Iron & Steel Co., Decatur, Ala.
Falstrom Co., Passaic, N. J.
Inland Steel Products Co., Milwaukee, Wis.
International Steel Co., Evansville, Ind.
Kane Mfg. Corp., Kane, Pa.
Kirk & Blum Mfg. Co., Cincinnati, O.
Knapp Bros. Mfg. Co. Inc., Cincinnati, O.
Lockjoint Wood Products Co., Wichita, Kan.
Lumm Co., A. H., Toledo, O.
Technical Ply-Woods, Chicago, Ill.
Truscon Steel Co., Youngstown, O.
Walsh Co., L. M., The, Boston, Mass.
Western Wire & Iron Works, Inc., Chicago, Ill. (Metal)

DRAFT CONTROL

See Controls, Draft, Barometric; Regulators, Draft, Combustion

DRAFT GAGES

See Gages, Indicating, Draft

DRAFT RECORDERS

See Recorders, Draft

DRAFT REGULATORS

See Controls, Draft, Barometric; Regulators, Draft, Combustion

DRAWING TEMPLATES, PIPING

See Templates, Drawing, Piping

DRIERS

See Dehydrators, Refrigerant

DRILLS, ELECTRIC AND PNEUMATIC, PORTABLE

Albertson & Co., Inc., Sioux City, Ia.
Black & Decker Mfg. Co., Towson, Md.
Buckeye Tools Corp., Dayton, O.
Chicago Pneumatic Tool Co., New York, N. Y.
Cincinnati Electrical Tool Co., The, Cincinnati, O.
Clark Electric Co., Jas., Jr., Louisville, Ky.
Fasco Industries, Inc., Rochester, N. Y.
Greyhound A. C. Arc Welder Corp., Brooklyn, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
●Ingersoll-Rand Co., New York, N. Y.
●Joy Mfg. Co., Pittsburgh, Pa.
Keller Tool Co., Grand Haven, Mich.
Lee Co., K. O., Aberdeen, S. D.
Mall Tool Co., Chicago, Ill.
Millers Falls Co., Greenfield, Mass.
Portable Electric Tools, Inc., Chicago, Ill.
R C S Tool Sales Corp., Joliet, Ill.
Signal Electric Mfg. Co., Menominee, Mich.
Skilsaw, Inc., Chicago, Ill.
Spartan Tool Co., Chicago, Ill.
Speedway Mfg. Co., Chicago (Cicero), Ill.
Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Syntron Co., Homer City, Pa.
U. S. Electrical Tool Co., Cincinnati, O.
Willey's Carbide Tool Co., Detroit, Mich.
Wodack Electric Tool Corp., Chicago, Ill.

DRILLS, POWDER OPERATED

Ramset Fasteners, Inc., Cleveland, O.
Remington Arms Co., Inc., Bridgeport, Conn.
Tempo Products Co., Cleveland, O.
Velocity Power Tool Co., Pittsburgh, Pa. (drives studs for pipe hangers, etc. into concrete)

DRIVES, CHAIN

Caldwell Co., W. E., Louisville, Ky.
Chain Belt Co., Milwaukee, Wis.
CraneVeyor Corp., Los Angeles, Calif.
Diamond Chain Co., Inc., Indianapolis, Ind.
Horton Mfg. Co., Minneapolis, Minn.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Morse Chain Co., Detroit, Mich.
Ramsey Chain Co., Inc., Albany, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Whitney Chain Co., Hartford, Conn.

DRIVES, FLAT BELT

See also Belting, Leather and Belting, Rubber

American Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Browning Mfg. Co., Inc., Maysville, Ky.
Caldwell Co., W. E., Louisville, Ky.
Chicago Belting Co., Chicago, Ill.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Dick Co., Inc., R. & J., Passaic, N. J.
●Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., The, Denver, Colo.
Goodrich Co., B. F., Akron, O.
Horton Mfg. Co., Minneapolis, Minn.
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Rhoads & Sons, J. E., Philadelphia, Pa.
Williams & Son, I. B., Dover, N. H.
Wood's Sons Co., T. B., Chambersburg, Pa.

DRIVES, POWER FOR PIPE THREADING

Beaver Pipe Tools, Inc., Warren, O.
Ridge Tool Co., Elyria, O.
Toledo Pipe Threading Machine Co., Toledo, O.

DRIVES, V BELT

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Browning Mfg. Co., Inc., Maysville, Ky.
Chicago Belting Co., Chicago, Ill.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Congress Drives Div., Tann Corp., Detroit, Mich.
Dayton Rubber Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J.
●Dodge Mfg. Corp., Mishawaka, Ind.
●Durkee-Atwood Co., Minneapolis, Minn.
Gates Rubber Co., The, Denver, Colo.
Goldens' Foundry & Machine Co., Columbus, Ga.
Goodrich Co., B. F., Akron, O.
Horton Mfg. Co., Minneapolis, Minn.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Maurey Mfg. Corp., Chicago, Ill.
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Thermoid Co., Trenton, N. J.
V-Belt Clutch Co., Los Angeles, Calif.
Wayne Manufacturing Co., Pomona, Calif.
Wood's Sons Co., T. B., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

DRIVES, VARIABLE SPEED

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical; Reducers, Speed; Pulleys and Sheaves, for Belt Drives

DRYERS, INDUSTRIAL (COMPARTMENT, TUNNEL CONVEYOR, VACUUM, SPRAY, ROTARY, ETC.)

●Air & Refrigeration Corp., New York, N. Y.
Bowen Engineering, Inc., North Branch, N. J.
Buflovac Equipment Div. of Blaw-Knox Co., Buffalo, N. Y.
●Campbell Heating Co., Des Moines, Ia.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
Instant Drying Corp., New York, N. Y.
●Jackson & Church Co., Saginaw, Mich. (Dryer for corn, grain, hops, and wood)
Kirk & Blum Mfg. Co., Cincinnati, O.
Link-Belt Co., Chicago, Ill.
Louisville Drying Machine Div., General American Transportation Corp., Louisville, Ky.
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
Newcomb-Detroit Co., Detroit, Mich.
Peters-Dalton, Inc., Detroit, Mich.
Proctor & Schwartz, Inc., Philadelphia, Pa.
Raymond Pulverizer Div., Combustion Engineering-Superheater, Inc., Chicago, Ill.

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Ross Engineering Corp., J. O., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
Stokes Machine Co., F. J., Philadelphia, Pa.
●Struthers Wells Corp., Titusville, Pa.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Western Precipitation Corp., Los Angeles, Calif.

DRYERS, REFRIGERANT

See Dehydrators, Refrigerant

DUAL THERMOSTATS

See Thermostats, Two Temperature or Dual

DUCT CONNECTIONS

See Connections, Duct, Flexible; Connectors for Non-Metallic Duct Fabrication

DUCT FURNACES

See Heaters, Duct

DUCT HEATERS

See Heaters, Duct

DUCT INSULATION

See Insulation, Duct

DUCT THERMOSTATS

See Thermostats, Duct Type

DUCT TURNING VANES

See Vanes, Duct Turning, Prefabricated

DUCTS AND DUCT FITTINGS, PREFABRICATED, METALLIC

Acer & Whedon, Inc., Medina, N. Y.
Acme Mfg. Co., Holmesburg, Philadelphia, Pa.
Adelta Mfg. Co., Inc., Philadelphia, Pa.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
Buckeye Furnace Pipe Co., Columbus, O.
Champion Furnace Pipe Co., Peoria, Ill.
Char-Gale Mfg. Co., Minneapolis, Minn.
Chicago Furnace Supply Co., Chicago, Ill.
Chicago Metal Hose Corp., Maywood, Ill.
Clayton & Lambert Mfg. Co., Louisville, Ky.
Corbman Bros., Inc., Philadelphia, Pa.
Excelsior Steel Furnace Co., Chicago, Ill.
General Corporation, Minneapolis, Minn.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Gray Metal Products, Inc., Rochester, N. Y.
Howes-Woods Co., Cambridge, Mass.
Inland Steel Products Co., Milwaukee, Wis.
International Heater Co., Utica, N. Y.
Jacobs Co., B. & J., Cincinnati, O.
Lennox Furnace Co., Marshalltown, Ia.
Littleford Bros., Inc., Cincinnati, O.
Meyer & Bro. Co., F., Peoria, Ill.
Moncrief Furnace Co., Atlanta, Ga.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Ohio Valley Hardware & Roofing Co., Evansville, Ind.
Schecter Brothers Co., Philadelphia, Pa.
Sioux Steel Co., Sioux Falls, S. D.
Smith-Raymond Co., Columbus, Ga.
Standard Furnace Supply Co., Omaha, Neb.
United States Register Co., Battle Creek, Mich.
Van Noorden Co., E. Boston, Mass.
Viking Mfg. Corp., Cleveland, O.
Waverly Heating Supply Co., Boston, Mass.
Williamson Heater Co., Cincinnati, O.

DUCTS AND DUCT FITTINGS, PREFABRICATED, NON-METALLIC

American Ventilating Hose Co., New York, N. Y.
Arrowhead Rubber Co., Downey, Calif.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
du Pont de Nemours & Co., E. I., Fabrics & Finishes Dept., Wilmington, Del.
Excelsior Steel Furnace Co., The, Chicago, Ill.
Flexible Tubing Corp., Guilford, Conn.
Haveg Corp., Newark, Del. (for fumes)
Jacobs Co., B. & J., Cincinnati, O.
Johns-Manville, New York, N. Y.
Knight, Maurice A., Akron, O. (also Permanite)
Smith-Raymond Co., Columbus, Ga.
Sonoco Products Co., Hartsville, S. C.
United States Rubber Co., New York, N. Y.

DYE PENETRANT

See Penetrant, Dye

DUST COLLECTORS

See Collectors, Dust

DUST COUNTERS

See Counters, Dust

ECONOMIZERS, FUEL

●Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Edge Moor Iron Works, Inc., Edge Moor, Del.
●Foster Wheeler Corp., New York, N. Y.
Green Fuel Economizer Co., Beacon, N. Y.
Rayfield Co., C. L., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.
Springfield Boiler Co., Springfield, Ill.

EJECTORS, SEWAGE

American-Marsh Pumps, Inc., Battle Creek, Mich.
●Chicago Pump Co., Chicago, Ill.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., New York, N. Y.
●Nash Engineering Co., South Norwalk, Conn.
Penberthy Injector Co., Detroit, Mich.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
●Weil Pump Co., Chicago, Ill.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Yeomans Bros. Co., Chicago, Ill.

ELBOWS, BALANCING, FOR HOT WATER HEATING SYSTEMS

Detroit Lubricator Co., Detroit, Mich.
Hammond Brass Works, Hammond, Ind.
Kehm Corp., The, Chicago, Ill.
Reynolds Shaffer Co., Detroit, Mich.
●Sarcotherm Controls, Inc., New York, N. Y.

ELECTRIC AIR CLEANERS

See Cleaners, Air, Electrical

ELECTRICAL RADIANT HEATING

See Conductors and Panels, Electrical, for Radiant Heating

ELECTRIC DRILLS

See Drills, Electric, Portable

ELECTRIC MOTORS

See Motors, Electric

ELECTRIC PIPE HEATING SYSTEMS

See Systems, Electric Pipe Heating

ELECTRIC SHEARS

See Shears, Electric, Portable

ELECTRIC UNIT HEATERS

See Heaters, Unit, Electric Heating Element

ELECTRIC WATER HEATERS

See Heaters, Water, Electric

ELECTRODES, ARC WELDING

Air Reduction Sales Co., New York, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Allied Weld-Craft, Inc., Indianapolis, Ind.
American Agile Corp., Cleveland, O.
American Brass Co., Waterbury, Conn.
American Steel & Wire Co., United States Steel Corp. Subsidiary, Cleveland, O.
Arcos Corp., Philadelphia, Pa.
Eutectic Welding Alloys Corp., New York, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Harnischfeger Corp., Milwaukee, Wis.
Hobart Bros. Co., Troy, O.
International Nickel Co., Inc., The, New York, N. Y.
Jessop Steel Co., Washington, Pa.
Laclede Steel Co., St. Louis, Mo.
●Lincoln Electric Co., Cleveland, O.
Marquette Mfg. Co., Minneapolis, Minn.
Maurath, Inc., Cleveland, O.
McKay Co., Pittsburgh, Pa.
Metal & Thermit Corp., New York, N. Y.
Mir-O-Col Alloy Co., Inc., Los Angeles, Calif. (for hard facing)
National Carbon Co., Div. of Union Carbide & Carbon Corp., New York, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Page Steel & Wire Division of American Chain & Cable Co., Inc., Monessen, Pa.
Sight Feed Generator Co., West Alexandria, O.
Smith Corp., A. O., Milwaukee, Wis.

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Trindl Products, Ltd., Chicago, Ill.
Westinghouse Electric Corp., Pittsburgh, Pa.
Wilson Welder & Metals Co., Inc., New York, N. Y.

ELIMINATORS, AIR, FOR HEATING AND PIPING SYSTEMS

●Anderson Co., V. D., The, Cleveland, O.
●Armstrong Machine Works, Three Rivers, Mich.
●Bell & Gossett Co., Morton Grove, Ill.
●Dole Valve Co., The, Chicago, Ill.
●Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
Keeney Mfg. Co., Newington, Conn.
Livingstone Engineering Co., Worcester, Mass.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marsh Heating Equipment Co., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Moreheat Distribution, Inc., Cincinnati, O.
Mueller Steam-Specialty Co., Inc., Long Island City, N. Y.
Multiplex Mfg. Co., Berwick, Pa.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Squires Co., C. E., The, Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Vapor Specialty Co., New York, N. Y.
Wright-Austin Co., Detroit, Mich.

ENAMELS AND LACQUERS

Acme White Lead & Color Works, Detroit, Mich.
Acorn Refining Co., Cleveland, O.
American-Marietta Co., Chicago, Ill.
Arco Co., The, Cleveland, O.
Atlas Powder Co., North Chicago, Ill.
Baer Bros., New York, N. Y.
Barreled Sunlight Paint Co., Providence, R. I.
Blue Ridge Talc Co., Inc., Henry, Va.
Claronex Products, Inc., Brooklyn, N. Y.
Cordo Chemical Co., Norwalk, Conn.
Debevoise Co., The, Brooklyn, N. Y.
Devoe & Raynolds Co., Inc., New York, N. Y.
Dixon Crucible Co., Joseph, Jersey City, N. J.
du Pont de Nemours & Co. (Inc.) E. I., Fabrics & Finishes Dept., Wilmington, Del.
Hague & Co., Alfred, Brooklyn, N. Y.
Heresite & Chemical Co., Manitowoc, Wis.
Hilo Varnish Corp., Brooklyn, N. Y.
Horn Co., Inc., A. C., Long Island City, N. Y.
Inter-Coastal Paint Corp., East St. Louis, Ill.
Interchemical Corp., Finishes Div., Newark, N. J.
Irvington Varnish and Insulator Co., Irvington, N. J.
Knight, Maurice A., Akron, O.
Koppers Co., Inc., Pittsburgh, Pa.
Krehbiel Co., J. H., Chicago, Ill.
Mass & Waldstein Co., Newark, N. J.
Master Mechanics Co., Cleveland, O.
Midwest Products Co., Port Byron, Ill.
O'Brien Corp., The, South Bend, Ind.
Permatex Co., Inc., Brooklyn, N. Y.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Quigley Co., Inc., New York, N. Y.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Sherwin-Williams Co., The, Cleveland, O.
Sipe & Co., James B., Pittsburgh, Pa.
Sonneborn Sons, Inc., L., New York, N. Y.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
Thompson & Co., Oakmont, Pa.
Tropical Paint & Oil Co., Cleveland, O.
Truscon Laboratories, Detroit, Mich.
United Chromium, Inc., New York, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Watson-Standard Co., Pittsburgh, Pa.
Wilbur & Williams Co., Brighton, Mass.
Wilhelm Co., A., Reading, Pa.
Zaco Laboratories, Div. Zip Abrasive Co., Cleveland, O. (spray units)

ENCLOSURES FOR PERIMETER AIR CONDITIONING SYSTEMS AND AIR CONDITIONING UNITS

Brandt & Co., Inc., Eugene J., New York, N. Y.
Contractor's Engineering Co., New York, N. Y.
Hinrichsen, Inc., A. F., New York, N. Y.
National Sheet Metal Works, New York, N. Y.

ENGINES, DIESEL, FOR FAN, PUMP AND COMPRESSOR DRIVES

American Locomotive Co., Auburn, N. Y.
Anderson Diesel Engine Co., Philadelphia, Pa.
Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.
Buda Co., Harvey, Ill.
Caterpillar Tractor Co., Peoria, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Continental Motors Corp., Muskegon, Mich.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Detroit Diesel Engine Div., General Motors Corp., Detroit, Mich.
Fairbanks, Morse & Co., Chicago, Ill.
Hill Diesel Engine Corp., Lansing, Mich.
●Ingersoll-Rand Co., New York, N. Y.
Ready-Power Co., The, Detroit, Mich.
Synchro-Start Products, Inc., Chicago, Ill. (automatic controls to start, stop and protect internal combustion engines)
Waukesha Motors Co., Waukesha, Wis.
Witte Engine Works, Div. of Oil Well Supply Co., United States Steel Corp., Sub., Kansas City, Mo.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES, GAS, FOR FAN, PUMP AND COMPRESSOR DRIVES

Buda Co., Harvey, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Continental Motors Corp., Detroit, Mich.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks Morse & Co., Chicago, Ill.
●Ingersoll-Rand Co., New York, N. Y.
Ready-Power Co., The, Detroit, Mich.
Synchro-Start Products, Inc., Chicago, Ill. (automatic controls to start, stop and protect internal combustion engines)
Waukesha Motor Co., Waukesha, Wis.
Wayne Manufacturing Co., Pomona, Calif.
Witte Engine Works, Div. of Oil Well Supply Co., United States Steel Corp., Sub., Kansas City, Mo.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES, STEAM, FOR FAN, PUMP AND COMPRESSOR DRIVES

Harrisburg Machinery Corp., Harrisburg, Pa.
Skinner Engine Co., Erie, Pa.
Troy Engine & Machine Co., Troy, Pa.
Vilter Mfg. Co., Milwaukee, Wis.
Wachs Co., E. H., The, Chicago, Ill.
Westinghouse Electric Corp., Pittsburgh, Pa.

EQUIPMENT, BALANCING

Bear Mfg. Co., Industrial Div., Rock Island, Ill.
Gisholt Machine Co., Madison, Wis.
Olsen Testing Machine Co., Tinius, Willow Grove, Pa.

EVAPORATIVE CONDENSERS

See Condensers, Refrigerating, Evaporative

EVAPORATIVE COOLERS

See Units, Air Conditioning, Summer, Evaporative Cooling Type

EVAPORATORS

See Chillers, Water

EXCHANGERS, HEAT

Adams Co., Inc., R. P., Buffalo, N. Y. (water to air)
●Aerofin Corp., Syracuse, N. Y.
Airecon Industries, Detroit, Mich.
Aluminum Co., of America, Pittsburgh, Pa.
American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Armstrong Co., Richard M., Westchester, Pa.
Baker Refrigeration Corp., Inc., South Windham, Me.
●Bell & Gossett Co., Morton Grove, Ill.
Biggs Boiler Wks., Co., The, E. Akron, O.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bowen Engineering, Inc., North Branch, N. J.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass.
Cochrane Corp., Philadelphia, Pa.
Condenser Service & Engineering Co., Inc., Hoboken, N. Y.
Corning Glass Works, Corning, N. Y.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Dahlquist Mfg. Co., Inc., Div. of Process Engineering Inc., Somerville, Mass.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. J., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Duriron Co., The, Dayton, O. (acid resisting)
Eastern Industries, Inc., New Haven, Conn.
Fedders-Quigan Corp., Buffalo, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Fluor Corp., Ltd., The, Los Angeles, Calif.
●Foster Wheeler Corp., New York, N. Y.
●Frick Co., Waynesboro, Pa.
General Ceramics & Steatite Corp., Keasbey, N. J. (Impervious Graphite)

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●General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gilbert Brass Foundry Co., St. Louis, Mo.
Goodyer Industries, Inc., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Graver Water Conditioning Co., New York, N. Y.
Griscom-Russell Co., The, New York, N. Y.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Heilman Boiler Wks., Inc., Allentown, Pa.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
●Joy Mfg. Co., Pittsburgh, Pa.
Kaiser Co., E. B., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kellogg Co., M. W., The, New York, N. Y.
Kold-Hold Mfg. Co., Lansing, Mich.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Lindy Heaters, Inc., New York, N. Y.
Madden & Co., P. E., Chicago, Ill.
Manitowoc Engineering Wks., Manitowoc, Wis.
●Marley Co., Inc., The, Kansas City, Kan.
●Marlo Coil Co., St. Louis, Mo.
●McQuay, Inc., Minneapolis, Minn.
Minimite Co., Chicago, Ill.
●Modine Mfg. Co., Racine, Wis.
●Mueller Brass Co., Port Huron, Mich.
Murray Mfg. Co., D. J., Wausau, Wis.
National Carbon Co., Div. of Union Carbide & Carbon Corp., New York, N. Y.
National Pipe Bending Co., New Haven, Conn.
National Radiator Co., The, Johnstown, Pa.
●Niagara Blower Co., New York, N. Y.
Nooter Corp., St. Louis, Mo.
Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
●Perfex Corp., Milwaukee, Wis.
Prat-Daniel Corp., East Port Chester, Conn.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Quaker City Iron Works, Philadelphia, Pa.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Reliable Products Mfg. Co., Brooklyn, N. Y.
Roessing Mfg. Co., Pittsburgh, Pa.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Schutte & Koerting Co., Cornwell Heights, Bucks County, Pa.
Sims Co., Erie, Pa.
Smith Corp., A. O., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
●Struthers Wells Corp., Titusville, Pa.
●Superior Combustion Industries, Inc., New York, N. Y.
Superior Valve & Fittings Co., Pittsburgh, Pa.
●Taco Heaters, Inc., Providence, R. I.
Techniflex Corp., Port Jervis, N. Y.
Thermal Industries, San Francisco, Calif.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vapor Heating Corp., Chicago, Ill.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whitlock Mfg. Co., Hartford, Conn.
Wilson Engineering Corp., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.
Yula Water Heaters, Inc., New York, N. Y.

EXCHANGERS, HEAT, REFRIGERANT SUCTION LINE

●Acme Industries, Inc., Jackson, Mich.
Armstrong Co., Richard M., Westchester, Pa.
Betz Corp., Hammond, Ind.
Black Mfg. Co., The, Parkton, Md.
Brown Fintube Co., The, Elyria, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Temprite Products Corp., Birmingham, Mich.
Wabash Mfg. Co., Chicago, Ill.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

EXHAUST HEADS

See Heads, Exhaust, for Pipe Lines

EXHAUSTERS, WELDING FUME

Aladdin Heating Corp., Oakland, Calif.
Allington & Curtis Mfg. Co., Saginaw, Mich.
●American Blower Corp., Detroit, Mich.
American Machine Products Co., Marshalltown, Ia.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
●Chicago Blower Corp., Chicago, Ill.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Coppus Engineering Corp., Worcester, Mass.
Dana Fan & Blower Corp., Cincinnati, O.
Day Co., The, Minneapolis, Minn.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
●Gallaher Co., The, Omaha, Neb. & Owatonna, Minn.
●General Blower Co., Morton Grove, Ill.
●Jenn Air Products Co., Indianapolis, Ind.
Kirk & Blum Mfg. Co., Cincinnati, O.
Mine Safety Appliances Co., Pittsburgh, Pa.
Peters-Dalton, Inc., Detroit, Mich.
●Propellair Div., Robbins & Myers Inc., Springfield, O.
Ruemelin Mfg. Co., Milwaukee, Wis.
Torit Mfg. Co., St. Paul, Minn.
Utility Appliance Corp., Beverly Hills, Calif.
Whiting Corp., Harvey, Ill.
●Wing Mfg. Co., L. J., Linden, N. J.
Wind-Way Fan & Ventilator Co., New Orleans, La.

EXPANDERS, TUBE

Chicago Pneumatic Tool Co., New York, N. Y.
Crane Packing Co., Chicago, Ill.
Key Co., East St. Louis, Ill.
●Knuth Engineering Co., Chicago, Ill.
Wilson, Inc., Thomas C., Long Island City, N. Y.

EXPANSION BENDS

See Bends, Expansion

EXPANSION BOLTS

See Bolts, Expansion

EXPANSION JOINTS

See Joints, Pipe, Expansion

EXPANSION TANKS

See Tanks, Expansion, for Hot Water Heating Systems

EXPANSION VALVES

See Valves, Refrigeration

EXTRACTORS, PIPE

Chicago Specialty Mfg. Co., Chicago, Ill.
Greenfield Tap & Die Corp., Greenfield, Mass.
Reps Tool Co., Inc., Hartford, Conn.
●Ridge Tool Co., Elyria, O.
Roddick Tool Co., Anaheim, Calif.

FABRICATED PIPING

See Bends; Headers; Joints, etc.

FABRICATORS, PIPE

See Headers, Welded; and Coils, Pipe

FAN BALANCING EQUIPMENT

See Equipment, Balancing

FAN BASES

See Bases and Pads, Vibration Isolating

FAN BLADES

See Blades, Propeller Fan

FAN HOUSINGS

See Housings, Fan, Centrifugal

FANS, AXIAL FLOW, PRESSURE TYPE

Aerovent Fan Co., Inc., Piqua, O. (Tubeaxial)
●American Blower Corp., Detroit, Mich.
Baltimore Fan Co., Baltimore, Md.
●Buffalo Forge Co., Buffalo, N. Y.
●Chicago Blower Corp., Chicago, Ill. (tubeaxial)
Circulators & Devices Mfg. Corp., Brooklyn, N. Y. (vaneaxial)
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Hartzell Propeller Fan Co., Piqua, O.
Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering Inc., Dayton, O.
●Joy Mfg. Co., Pittsburgh, Pa. (vaneaxial)
●Moore Co., The, Marceline, Mo. (vaneaxial)
●Propellair Div., Robbins & Myers Inc., Springfield, O.
Sensenich Corp., Lancaster, Pa.
●South Bend Air Products, Inc., South Bend, Ind.
Stanat Mfg. Co., Long Island City, N. Y. (vaneaxial—2, 4 & 6 in diameter)
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

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●Wing Mfg. Co., L. J., Linden, N. J.

FANS, CENTRIFUGAL

Advance Aluminum Castings Corp., Chicago, Ill.
Advance Fan & Blower Co., Detroit, Mich.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Aladdin Heating Corp., Oakland, Calif.
Allington & Curtis Mfg. Co., Saginaw, Mich.
●American Blower Corp., Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Machine Products Co., Marshalltown, Ia.
●Bayley Blower Co., Milwaukee, Wis.
Bern's Mfg. Co., Chicago, Ill.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blower Application Co., Milwaukee, Wis.
●Brundage Co., The, Kalamazoo, Mich.
●Buffalo Forge Co., Buffalo, N. Y.
●Campbell Heating Co., Des Moines, Ia.
Campbell Co., E. K., Kansas City, Mo.
Carolina Blower Co., Inc., Greensboro, N. C.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
●Chicago Blower Corp., Chicago, Ill.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Coppus Engineering Corp., Worcester, Mass.
Day Co., The, Minneapolis, Minn.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Eastern Air Devices, Inc., Brooklyn, N. Y.
●Eclipse Fuel Engineering Co, Rockford, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Ft. Worth Steel & Machinery Co., Ft. Worth, Tex.
Garden City Fan Co., Chicago, Ill.
General Blower Co., Inc., Philadelphia, Pa.
●General Blower Co., Morton Grove, Ill.
General Products Co., Philadelphia, Pa.
Goettl Bros. Metal Products Inc., Phoenix, Ariz.
Green Fuel Economizer Co., Beacon, N. Y.
Hastings Air Conditioning Co., Hastings, Neb.
Ilg Electric Ventilating Co., Chicago, Ill.
Indiana Fan Company, Indianapolis, Ind.
International Sales Co., San Francisco, Calif.
●Jackson & Church Co., Saginaw, Mich.
Jaden Mfg. Co., Hastings, Neb.
Jamieson Mfg. Co., Dallas, Tex.
Jeffrey Mfg. Co., Columbus, O.
●Jenn Air Products Co., Indianapolis, Ind.
King Co., The, Owatonna, Minn.
Lau Blower Co., Dayton, O.
Lehigh Fan & Blower Co., Allentown, Pa.
MaGirl Foundry & Furnace Co., Bloomington, Ill.
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
Martin Fan & Blower Co., Chicago, Ill.
Montag Stove & Furnace Wks., Portland, Ore.
Morrison Products Inc., Cleveland, O.
Motionair Co., Los Angeles, Calif.
Mountain States Equipment Co., Denver, Colo.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
●Murray Co. of Texas, The, Dallas, Tex.
National Engineering & Mfg. Co., Kansas City, Mo.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●New York Blower Co., Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
●Niagara Blower Co., New York, N. Y.
Northern Blower Co., Cleveland, O.
Palmer Mfg. Co., Phoenix, Ariz.
Peerless Electric Co., Warren, O.
Phelps Mfg. Co., Little Rock, Ark.
Prat-Daniel Corp., East Port Chester, Conn.
Reynolds Mfg. Co., The, Comstock Park, Mich.
Redmond Co., Inc., Owosso, Mich.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schwitzer-Cummins Co., Indianapolis, Ind.
Standard Electric Mfg. Co., West Berlin, N. J.
Torrington Mfg. Co., The, Western Div., Los Angeles, Calif.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
●Trane Co., The, LaCrosse, Wis.
United Electric Service Co., Wichita Falls, Tex.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Beverly Hills, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

FANS, PROPELLER

Acme Equipment Co., Muskogee, Okla.
Aeromatic Propeller Dept., Koppers Co., Inc., Baltimore, Md.
Aerovent Fan Co., Inc., Piqua, O.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Air Equipment Co., Chicago, Ill.
Airecon Industries, Inc., Detroit, Mich.
Aire-Foile Fan & Blower Co., Detroit, Mich.
Airmaster Corp., Chicago, Ill.
Allen Ventilator Div., Production Planning Co., Rochester, Mich.
●American Blower Corp., Detroit, Mich.
American Coolair Corp., Jacksonville, Fla.
Baldor Electric Co., St. Louis, Mo.
Baltimore Fan Co., Baltimore, Md.
Bar-Brook Mfg. Co., Inc., Shreveport, La.
Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.
Bern's Mfg. Co., Chicago, Ill.
●Binks Mfg. Co., Chicago, Ill.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Broan Mfg. Co., Inc., Milwaukee, Wis.
Bronson Fan Mfg. Co., Los Angeles, Calif.
●Buffalo Forge Co., Buffalo, N. Y.
C & H Air Conditioning Fan Co., Inc., Atlanta, Ga.
Carling Turbine Blower Co., Worcester, Mass.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. Y.
●Chicago Blower Corp., Chicago, Ill.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Climax Machinery Co., Indianapolis, Ind.
Commercialaire, Inc., Brooklyn, N. Y.
Coppus Engineering Corp., Worcester, Mass.
Dana Fan & Blower Corp., Cincinnati, O.
●De Bothezat Fans Div., American Machine & Metals, Inc., New York, N. Y.
DeVilbiss Co., The, Toledo, O.
Diehl Mfg. Co., Somerville, N. J.
Dual-Aîr Fan Co., South Elgin, Ill.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Eastern Air Devices, Inc., Brooklyn, N. Y.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fasco Industries, Inc., Rochester, N. Y.
Garden City Fan Co., Chicago, Ill.
●General Blower Co., Morton Grove, Ill.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
Guth Co., Edwin F., St. Louis, Mo.
Hartzell Propeller Fan Co., Piqua, O.
Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Holtum Mfg. Co., Freeport, Ill.
Hunter Fan & Ventilating Co., Inc., Memphis, Tenn.
Ilg Electric Ventilating Co., Chicago, Ill.
Indiana Fan Co., Indianapolis, Ind.
International Engineering, Inc., Dayton, O.
Jamieson Mfg. Co., Dallas, Tex.
Jeffrey Mfg. Co., Columbus, O.
●Jenn Air Products Co., Indianapolis, Ind.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
●Joy Mfg. Co., Pittsburgh, Pa.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lau Blower Co., Dayton, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Martin Fan & Blower Co., Chicago, Ill.
McLarty Systems, Battle Creek, Mich.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
●Moore Co., The, Marceline, Mo.
Motionair Co., Los Angeles, Calif.
Mountain States Equipment Co., Denver, Colo.
●Muckle Mfg. Co., Owatonna, Minn.
Myers Electric Co., Inc., Pittsburgh, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
National Gas Equipment Co., Inc., Terrell, Tex.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●New York Blower Co., Chicago, Ill.
Peerless Electric Co., Warren, O. (Disc)
Perkins & Son, Inc., B. F., Holyoke, Mass.
Phelps Mfg. Co., Little Rock, Ark.
●Pritchard & Co., J. F., Kansas City, Mo.
●Propellair Div., Robbins & Myers, Inc., Springfield, O.
Reed Unit-Fans, Inc., New Orleans, La.
Reynolds Electric Co., River Grove, Ill.
Roto-Beam, Chicago, Ill.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schwitzer-Cummins Co., Indianapolis, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Sensenich Corp., Lancaster, Pa.
Signal Electric Mfg. Co., Menominee, Mich.
Somers, Inc., H. J., Detroit, Mich.
●South Bend Air Products, Inc., South Bend, Ind.
Standard Electric Mfg. Co., West Berlin, N. J.
Sutton Corp., O. A., Wichita, Kan.
Swift Mfg. Co., Inc., Hazel Park, Mich.
Thermal Industries, Indio, Calif.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
●Trane Co., The, LaCrosse, Wis.
Truflow Fan Co., Harmony, Pa.
United Electric Service Co., Wichita Falls, Tex.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Beverly Hills, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.
●Western Engineering & Mfg. Co., Los Angeles, Calif.
Wind-Way Fan & Ventilating Co., New Orleans, La.
●Wing Mfg. Co., L. J., Linden, N. J.

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FASTENERS, INSULATION

Devices, Inc., New York, N. Y.
Moore, Inc., Goodloe, E., Danville, Ill.
Nelson Stud Welding Div., Morton Gregory Corp., Lorain, O.
●Ramset Fasteners, Inc., Cleveland, O.
Stic-Klip Mfg. Co., Cambridge, Mass.
Tinnerman Products, Inc., Cleveland, O.

FEEDERS, CHEMICAL, PROPORTIONING

American Water Softener Co., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bogue Electric Co., Paterson, N. J.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Cochrane Corp., Philadelphia, Pa.
Elgin Softener Corp., Elgin, Ill.
Fischer & Porter Co., Hatboro, Pa.
Fuller Co., Catasauqua, Pa.
Graver Water Conditioning Co., New York, N. Y.
Haering & Co., Inc., D. W., San Antonio, Tex.
Jeffrey Mfg. Co., Columbus, O.
Madden & Co., P. E., Chicago, Ill.
Milton Roy Co., Philadelphia, Pa.
National Aluminate Corp., Chicago, Ill.
% Proportioneers, Inc. %, Providence, R. I.
Paddock Engineering Co., of Texas, Dallas, Tex.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
Sprout, Waldron & Co., Muncy, Pa.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Syntron Co., Homer City, Pa.
Wallace & Tiernan Co., Inc., Newark, N. J.

FEEDERS, WATER, HEATING BOILER

Bailey Co., Chas. M., San Francisco, Calif.
Campbell Co., J. A., Long Beach, Calif.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Davis Regulator Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
Kieley & Mueller, Inc., North Bergen, N. J.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Magnetrol, Inc., Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Morehead Mfg. Co., Detroit, Mich.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Nason Co., Clarkston, Mich.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
●Penn Controls, Inc., Goshen, Ind.
Schaub Engineering Co., Fred H., Chicago, Ill.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
Templeton Bros., Hyde Park, Mass.
Watts Regulator Co., Lawrence, Mass.
●Webster & Co., Warren, Camden, N. J.

FEEDWATER HEATERS

See Deaerators

FIBER PACKING

See Packing, Fiber

FIBER PIPE

See Pipe, Fiber

FILTER GAGES

See Gages, Air Filter

FILTERS, AIR, AUTOMATIC

Air-Stream Filter Corp., St. Louis, Mo.
●American Air Filter Co., Inc., Louisville, Ky.
●Continental Air Filters, Inc., Louisville, Ky.
●Dollinger Corp., Rochester, N. Y.
●Farr Co., Los Angeles, Calif.
Ruemelin Mfg. Co., Milwaukee, Wis.

FILTERS, AIR, ELECTRIC

See Cleaners, Air, Electrical

FILTERS, AIR, GREASE

●Air Devices, Inc., New York, N. Y.
Air Filter Corp., Milwaukee, Wis.
Air-Maze Corp., Cleveland, O.
●American Air Filter Co., Inc., Louisville, Ky.
●Continental Air Filters, Inc., Louisville, Ky.
●Dollinger Corp., Rochester, N. Y.
●Farr Co., Los Angeles, Calif.
Filtair Mfg. Co., San Francisco, Calif.
●Research Products Corp., Madison, Wis.
Smith Filter Corp., Moline, Ill.

FILTERS, AIR, UNIT, CLEANABLE

●Air Devices, Inc., New York, N. Y.
Air Filter Corp., Milwaukee, Wis.
Air-Maze Corp., Cleveland, O.
Air-Stream Filter Corp., St. Louis, Mo.
●American Air Filter Co., Inc., Louisville, Ky.
Annis Air Filter Div., Royal Heaters, Inc., Alhambra, Calif.
Bard Mfg. Co., Bryan, O.
Carey Electronic Engineering Co., Metal Wool Div., Springfield, O.
●Continental Air Filters, Inc., Louisville, Ky.
Coppus Engineering Corp., Worcester, Mass.
●Dollinger Corp., Rochester, N. Y.
●Farr Co., Los Angeles, Calif.
Goodyear Tire & Rubber Co., Akron, O.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Research Products Corp., Madison, Wis.
Somers, Inc., H. J., Detroit, Mich.
Smith Filter Corp., Moline, Ill.
Supreme Air Filter Co., New York, N. Y.

FILTERS, AIR, UNIT, RENEWABLE MEDIA

●American Air Filter Co., Inc., Louisville, Ky.
Annis Air Filter Div., Royal Heaters, Inc., Alhambra, Calif.
●Dollinger Corp., Rochester, N. Y.
●Glasfloss, New York, N. Y.
Research Products Corp., Madison, Wis.

FILTERS, AIR, UNIT, THROW-AWAY

●American Air Filter Co., Inc., Louisville, Ky.
Cambridge Corp., Syracuse, N. Y.
Drico Industrial Corp., New York, N. Y.
●Glasfloss, New York, N. Y.
Mine Safety Appliances Co., Pittsburgh, Pa.
Morf Industries, Inc., Staten Island, N. Y.
●Owens-Corning Fiberglas Corp., Toledo, O.
●Research Products Corp., Madison, Wis.
Wilson & Co., Inc., Chicago, Ill.

FILTERS FOR OIL BURNERS

Commercial Filters Corp., Boston, Mass.
General Filters, Inc., Detroit, Mich.
Rega Mfg. Co., Rochester, N. Y.
W. G. B. Oil Clarifier, Inc., Kingston, N. Y.

FILTERS, ODOR

See Adsorbers, Odor

FILTERS, PIPE LINE

Adams Co., Inc., R. P., Buffalo, N. Y.
Air-Line Engineering Co., Cleveland, Ohio
Air-Maze Corp., Cleveland, Ohio.
●Alco Valve Co., St. Louis, Mo.
●American Air Filter Co., Inc., Louisville, Ky.
American Cyanamid & Chemical Corp., New York, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Andale Co., Philadelphia, Pa.
Anderson Co., V. D., The, Cleveland, O.
Bowser, Inc., Fort Wayne, Ind.
CCA Products, Inc., Glendale, Calif.
Champion Laboratories, Inc., Meriden, Conn.
Cleveland Humidifier Co., Cleveland, O.
Commercial Filters Corp., Boston, Mass.
Conoflow Corp., Philadelphia, Pa.
Cuno Engineering Corp., Meriden, Conn.
DeVilbiss Co., The, Toledo, O.
●Dollinger Corp., Rochester, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
●Fisher Governor Co., Marshalltown, Ia.
Fram Corp., Providence, R. I.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
General Filters, Inc., Detroit, Mich.
Johnson Corp., The, Three Rivers, Mich.
Kaye & MacDonald, Inc., West Orange, N. J.
Kraissl Co., Inc., The, Hackensack, N. J.
Marvel Engineering Co., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
Micro Metallic Corp., Glen Cove, N. Y.
Moraine Products Div., General Motors Corp., Dayton, O. (Porous metal)
Morse-Smith-Morse, Inc., Watertown, Mass.
Newark Wire Cloth Co., Newark, N. J.
Norgren Co., C. A., Englewood, Colo.
Norwalk Valve Co., South Norwalk, Conn.
Patrol Valve Co., The, Cleveland, O.
Rega Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Selas Corp. of America, Philadelphia, Pa.
Standard Machine & Mfg. Co., St. Louis, Mo.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Trerice Co., Detroit, Mich.

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Warner Lewis Co., Tulsa, Okla.
Winslow Engineering Co., Oakland, Calif.
Worthington Pump & Machinery Corp., Harrison, N. J.

FILTERS, REFRIGERANT

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Commercial Filters Corp., Boston, Mass.
●Dollinger Corp., Rochester, N. Y.
General Filter Co., Ames, Ia.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
McIntire Connector Co., Newark, N. J.
Moraine Products Div., General Motors Corp., Dayton, O. (Porous metal)
●Mueller Brass Co., Port Huron, Mich.
Newark Wire Cloth Co., Newark, N. J.
Phillips & Co., H. A., Chicago, Ill.
Remco, Inc., Zelienople, Pa.
●Sporlan Valve Co., St. Louis, Mo.
Standard Machine & Mfg. Co., St. Louis, Mo.
Wabash Mfg. Co., Chicago, Ill.

FILTERS, WATER

Adams Co., Inc., R. P., Buffalo, N. Y.
●Alco Valve Co., St. Louis, Mo.
American Cyanamid & Chemical Corp., New York, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Aqua-Mist Co., Topeka, Kan. (Aspenwood fibre)
Bogue Electric Co., Paterson, N. J.
Bowser, Inc., Fort Wayne, Ind.
Cochrane Corp., Philadelphia, Pa.
Commercial Filters Corp., Boston, Mass.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cuno Engineering Corp., Meriden, Conn.
●Dollinger Corp., Rochester, N. Y.
Duro Co., Dayton, O.
Electric Sprayit Co., The, Sheboygan, Wis.
Elgin Softener Corp., Elgin, Ill.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Graver Water Conditioning Co., New York, N. Y.
Greer Hydraulics, Inc., Brooklyn, N. Y.
●Henry Valve Co., Melrose Park, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Micro Metallic Corp., Glen Cove, N. Y.
Newark Wire Cloth Co., Newark, N. J.
Norwood Associated Engineers Inc., Springfield, Mass.
% Proportioneers, Inc. %, Providence, R. I.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
●Refinite Corp., Omaha, Neb.
Research Products Corp., Madison, Wis.
Stover Water Softener Co., St. Charles, Ill.
Uniflow Mfg. Co., Erie, Pa.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Winslow Engineering Co., Oakland, Calif.
Worthington Pump & Machinery Corp., Harrison, N. J.

FINNED TUBING

See Tubing, Finned

FIRE EXTINGUISHING SYSTEMS

See Systems, Fire Extinguishing

FIRE PUMPS

See Pumps, Fire

FITTINGS, BLOW PIPE

Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
Allington & Curtis Mfg. Co., Saginaw, Mich.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Carolina Blower Co., Inc., Greensboro, N. C.
Chicago Metal Mfg. Co., Chicago, Ill.
Day Co., The, Minneapolis, Minn.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Griffin & Co., Louisville, Ky.
Kirk & Blum Mfg. Co., Cincinnati, O.
National Metal Fabricators, Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Northern Blower Co., Cleveland, O.
Peters-Dalton, Inc., Detroit, Mich.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schmieg Industries, Detroit, Mich.
Tiffin Eaves Trough Clamp Co., Tiffin, O.
Torit Mfg. Co., St. Paul, Minn.
United States Register Co., Battle Creek, Mich.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
Young & Bertke Co., Cincinnati, O.

FITTINGS, COPPER TUBE, COMPRESSION

Aircraft Fittings Co., Cleveland, O.
American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Couplings Co., Chicago, Ill.
●Dole Valve Co., The, Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Everhot Products Co., Chicago, Ill.
Hays Mfg. Co., Erie, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Oil Equipment Mfg. Corp., New Haven, Conn.
Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Wabash Mfg. Co., Chicago, Ill.
Weatherhead Co., Cleveland, O.

FITTINGS, COPPER TUBE, FLARED

Acheson Mfg. Co., Rankin, Pa.
Aircraft Fitting Co., Cleveland, O.
American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Couplings Co., Chicago, Ill.
●Dole Valve Co., The, Chicago, Ill.
Everhot Products Co., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
Hays Mfg. Co., Erie, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Oil Equipment Mfg. Corp., New Haven, Conn.
Parker Appliance Co., The, Cleveland, O.
Phoenix Brass Fittings Corp., Irvington, N. J.
Remco, Inc., Zelienople, Pa.
Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Truetite Corp., The Bridgeport, Conn.
Weatherhead Co., Cleveland, O.

FITTINGS, COPPER TUBE, SOLDER

Acheson Mfg. Co., Rankin, Pa.
American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
●General Fittings Co., Providence, R. I.
Grabler Mfg. Co., Cleveland, O.
Hammond Brass Works, Hammond, Ind.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Phoenix Brass Fittings Corp., Irvington, N. J.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y. (Brazed)

FITTINGS, DRAINAGE, FIXED AIR BREAK

●Crane Co., Chicago, Ill.
Semler Co., Jeannette, Pa.

FITTINGS, HOT WATER HEATING SYSTEMS, ONE PIPE

Autostributor Co., Lansing, Mich. (manifold for connecting radiator branches)
●Bell & Gossett Co., Morton Grove, Ill.
General Heaters & Regulators Co., Chicago, Ill.
Gold Top Heating, Inc., Butte, Mont.
Kehm Corp., The, Chicago, Ill.
Mel Products Co., The, New Haven, Conn.
Sall Bros. Co., Rockford, Ill.
Semler Co., Jeannette, Pa.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.

FITTINGS, LINED

American Hard Rubber Co., New York, N. Y. (Rubber)
Bart Mfg. Corp., Belleville, N. J.
Cement Lined Pipe Co., Lynn, Mass. (Lead and tin)
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O. (Rubber)
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin)
Michigan Pipe Co., Bay City, Mich. (Wood, saran rubber)
National Lead Co., New York, N. Y. (Lead)
Northern Indiana Brass Co., Elkhart, Ind. (Tinned)
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (lead)
Saran Lined Pipe Co., Ferndale, Mich.
United States Rubber Co., New York, N. Y. (Rubber)
Warren Foundry & Pipe Corp., New York, N. Y. (cement)
Welstrom Inc., Hamilton, O. (welding)

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FITTINGS, PIPE, ALUMINUM

Aircraft Fitting Co., Cleveland, O.
Aluminum Co. of America, Pittsburgh, Pa.
●Ladish Co., Cudahy, Wis.
●Taylor Forge & Pipe Wks., Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.

FITTINGS, PIPE, BRASS, THREADED

Acheson Mfg. Co., Rankin, Pa.
Aircraft Fitting Co., Cleveland, O.
American Manganese Bronze Co., Philadelphia, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bowser, Inc., Fort Wayne, Ind.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Couplings Co., The, Chicago, Ill.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Gilbert Brass Foundry Co., St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., Elmira, N. Y.
●Ladish Co., Cudahy, Wis.
Lunkenheimer Co., Cincinnati, O.
New York Brass Fdry., New York, N. Y.
Parker Appliance Co., Cleveland, O.
Penn Mfg. Corp., of Washington, Pa., Washington, Pa.
Phoenix Brass Fittings Corp., Irvington, N. J.
U. S. Plug & Fitting Co., Wellington, O. (pipe plugs)
Union Metal Wks., Chelsea, Mass.
●Walworth Co., New York, N. Y.
Weatherhead Co., The, Cleveland, O.

FITTINGS, PIPE, BRASS, WELDING

Chase Brass & Copper Co., Waterbury, Conn.
●Ladish Co., Cudahy, Wis.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York., N. Y. (Brazed)

FITTINGS, PIPE, BRONZE, BRAZED

American Brass Co., Waterbury, Conn.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y.

FITTINGS, PIPE, BRONZE, SOLDER

Acheson Mfg. Co., Rankin, Pa.
American Brass Co., Waterbury, Conn.
●Crane Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
●General Fittings Co., Providence, R. I.
Gilbert Brass Foundry Co., St. Louis, Mo.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Union Malleable Mfg. Co., Ashland, O.
Union Metal Works, Chelsea, Mass.

FITTINGS, PIPE, CAST IRON, FLANGED

Alabama Pipe Co., Anniston, Ala.
Altens Foundry & Machine Works, Inc., Lancaster, O.
American Cast Iron Pipe Co., Birmingham, Ala.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kuhns Bros. Co., Dayton, O.
Lynchburg Foundry Co., Lynchburg, Va.
Malleable Iron Fittings Co., Branford, Conn.
National Valve & Mfg. Co., Pittsburgh, Pa.
Parks-Cramer Co., Fitchburg Mass. (Jacketed)
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semler Co., Jeannette, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., The, Syracuse, N. Y.
United States Pipe & Foundry Co., Burlington, N. J.
Vilter Mfg. Co., The, Milwaukee, Wis.
●Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.

FITTINGS, PIPE, CAST IRON, THREADED

Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kuhns Bros. Co., Dayton, O.
Malleable Iron Fittings Co., Branford, Conn.
Ravena Iron Co., Ravena, N. Y.
Semler Co., Jeannette, Pa.
Somerville Iron Works, Somerville, N. J.
Stockham Valves & Fittings, Birmingham, Ala.
U. S. Plug & Fitting Co., Wellington, O. (pipe plug)
Vilter Mfg. Co., The, Milwaukee, Wis.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS, PIPE, COMPRESSION

Aircraft Fitting Co., Cleveland, O.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Hays Mfg. Co., Erie, Pa.
Patrol Valve Co., The, Cleveland, O.

FITTINGS, PIPE, HARD RUBBER

American Hard Rubber Co., New York, N. Y.
Goodrich Co., B. F., Akron, O.
Luzerne Rubber Co., Trenton, N. J.
Raybestos-Manhattan, Inc., Passaic, N. J.
Stokes Molded Products, Inc., Trenton, N. J.
United States Rubber Co., New York, N. Y.

FITTINGS, PIPE, LEAD

Alpha Metals, Inc., Brooklyn, N. Y.
Division Lead Co., Chicago, Ill.
Eagle Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Resisto Pipe & Valve Co., East Cambridge, Mass.
Rochester Lead Works, Inc., Rochester, N. Y.
●Tube Turns, Inc., Louisville, Ky.

FITTINGS, PIPE, MALLEABLE

Corley Co., Inc., The, Jersey City, N. J.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki, Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Malleable Iron Fittings Co., Branford, Conn.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Rhode Island Fittings Co., Providence, R. I.
Stockham Valves & Fittings, Birmingham, Ala.
U. S. Plug & Fitting Co., Wellington, O. (pipe plugs)
Union Malleable Mfg. Co., Ashland, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS, PIPE, MALLEABLE, BRAZED

Flagg & Co., Inc., Stanley G., Philadelphia, Pa.

FITTINGS, PIPE, NICKEL AND NICKEL ALLOY

American Manganese Bronze Co., Philadelphia, Pa.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
Hasco Valve & Machine Co., Milwaukee, Wis.
International Nickel Co., Inc., The, New York, N. Y.
●Ladish Co., Cudahy, Wis.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.
Welding Fittings Corp., New Castle, Pa.

FITTINGS, PIPE, PLASTIC

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.

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American Agile Corp., Cleveland, O.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
General Ceramics & Steatite Corp., Keasbey, N. J.
Haveg Corp., Newark, Del.
Mills Corp., Elmer E., Chicago, Ill.
North Penn Co., New York, N. Y.
Saran Lined Pipe Co., Ferndale, Mich.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

FITTINGS, PIPE, SADDLE TEE

Skinner Co., M. B., South Bend, Ind.
●Tube Turns, Inc., Louisville, Ky.

FITTINGS, PIPE, SANITARY

Duriron Co., Inc., The, Dayton, O. (corrosion resisting)
Stockham Valves & Fittings, Birmingham, Ala.
Tri-Clover Machine Co., Kenosha, Wis.
●Tube Turns, Inc., Louisville, Ky.

FITTINGS, PIPE, STAINLESS STEEL

Aircraft Fitting Co., Cleveland, O.
Camco Products Inc., New Haven, Conn.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Potts Co., Horace T., Philadelphia, Pa.
Pypon Co., Pittsburgh, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis.
●Tube Turns, Inc., Louisville, Ky.
U. S. Plug & Fitting Co., Wellington, O. (pipe plugs)
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.
Welding Fittings Corp., New Castle, Pa.

FITTINGS, PIPE, STAINLESS STEEL, WELDING

Cooper Alloy Foundry Co., The, Hillside, N. J.
Electric Steel Foundry Co., Portland, Ore.
Key Co., East St. Louis, Ill.
●Ladish Co., Cudahy, Wis.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
●Taylor Forge & Pipe Wks., Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
Welding Fittings Corp., New Castle, Pa.

FITTINGS, PIPE, STEEL, FLANGED

Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
●Bonney Forge & Tool Works, Allentown, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
Kerotest Mfg. Co., Pittsburgh, Pa.
Michigan Pipe Co., Bay City, Mich.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Semet-Solvay Engrg Div., Allied Chemical & Dye Corp., New York, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.

FITTINGS, PIPE, STEEL, FORGED, THREADED

American Meter Co., Inc., New York, N. Y.
●Bonney Forge & Tool Works, Allentown, Pa.
Capitol Mfg. & Supply Co., Columbus, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Henry Valve Co., Melrose Park, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Ladish Co., Cudahy, Wis.
Larkin Packer Co., St. Louis, Mo.
U. S. Plug & Fitting Co., Wellington, O. (pipe plugs)
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, SOCKET WELD

●Bonney Forge & Tool Works, Allentown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
●Ladish Co., Cudahy, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, THREADED

●Bonney Forge & Tool Works, Allentown, Pa.
Capitol Mfg. & Supply Co., Columbus, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Henry Valve Co., Melrose Park, Ill.
●Ladish Co., Cudahy, Wis.
Parker Appliance Co., The, Cleveland, O.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Tubing Seal-Cap, Inc., Los Angeles, Calif. (plugs and caps)
U. S. Plug & Fitting Co., Wellington, O. (pipe plugs)
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, WELDING

Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
●Bonney Forge & Tool Works, Allentown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Gustin Bacon Mfg. Co., Kansas City, Mo.
●Ladish Co., Cudahy, Wis.
Larkin Packer Co., St. Louis, Mo.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis. (stainless steel)
●Tube Turns, Inc., Louisville, Ky.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Welding Fittings Corp., New Castle, Pa.

FITTINGS, PIPE, WROUGHT IRON, WELDING

●Bonney Forge & Tool Works, Allentown, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.

FITTINGS, REFRIGERATION

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
Aminco Refrigeration Products Co., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
●Crane Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
●Frick Co., Waynesboro, Pa.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Ladish Co., Cudahy, Wis.
Madden Brass Products Co., The, Chicago, Ill.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Remco, Inc., Zelienople, Pa.
Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Superior Valve & Fittings Co., Pittsburgh, Pa.
U. S. Plug & Fitting Co., Wellington, O. (pipe plugs)
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Wabash Mfg. Co., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.
Weatherhead Co., Cleveland, O.
Wittenmeier Machinery Co., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning & Re-

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frigeration Div., Harrison, N. J.
X L Refrigerating Co., Inc., Chicago, Ill.
York Corp., York, Pa.

FITTINGS, STEEL TUBE, FLARED

Aircraft Fitting Co., Cleveland, O.
Couplings Co., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
Parker Appliance Co., The, Cleveland, O.
Weatherhead Co., The, Cleveland, O.
York Corp., York, Pa.

FITTINGS, STEEL TUBE, FLARELESS

Imperial Brass Mfg. Co., Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Weatherhead Co., The, Cleveland, Ohio

FLAME CONTROLS

See Controls, Flame Failure

FLANGE BOLTS

See Bolts and Studs, Flange

FLANGE SEPARATORS

See Separators, Flange

FLANGES, ORIFICE

Altena Foundry & Machine Works, Inc., Lancaster, O.
American Meter Co., Inc., New York, N. Y.
Barton Instrument Corp., Los Angeles, Calif.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Conoflow Corp., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Foxboro Co., Foxboro, Mass.
●Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
Madden & Co., P. E., Chicago, Ill.
Meriam Instrument Co., The, Cleveland, O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Trimount Instrument Co., Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, ALLOY STEEL, LAP JOINT

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, ALLOY STEEL, SCREWED

Camco Products Inc., New Haven, Conn.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
●Taylor Forge & Pipe Works, Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FLANGES, PIPE, ALLOY STEEL, WELDING

Camco Products Inc., New Haven, Conn.
Cooper Alloy Foundry Co., Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
Key Co., East St. Louis, Ill.
●Ladish Co., Cudahy, Wis.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Welding Fitttings Corp., New Castle, Pa.

FLANGES, PIPE, BRASS, SCREWED

Acheson Mfg. Co., Rankin, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Providence, R. I.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Ladish Co., Cudahy, Wis.
National Valve & Mfg. Co., Pittsburgh, Pa.
Northern Indiana Brass Co., Elkhart, Ind.
Quaker City Iron Wks., Philadelphia, Pa.
●Ritter Pattern & Casting Co., New York, N. Y.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, CAST IRON, SCREWED

Altena Foundry & Machine Works, Inc., Lancaster, O.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kuhns Bros. Co., Dayton, O.
Lynchburg Foundry Co., Lynchburg, Va.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Ravena Iron Co., Ravena, N. Y.
●Ritter Pattern & Casting Co., New York, N. Y.
Semler Co., Jeannette, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., Syracuse, N. Y.
U. S. Plug & Fitting Co., Wellington, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Warren Foundry & Pipe Corp., New York, N. Y.

FLANGES, PIPE, MALLEABLE IRON, SCREWED

Baker Refrigeration Corp., South Windham, Me.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
●Jefferson Union Co., New York, N. Y.
National Valve & Mfg. Co., Pittsburgh, Pa.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, NICKEL AND NICKEL ALLOY

Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
Hasco Valve & Machine Co., Milwaukee, Wis.
International Nickel Co., Inc., The, New York, N. Y.
●Ladish Co., Cudahy, Wis.
Pennsylvania Forge Co., Philadelphia, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis.
●Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Welding Fittings Corp., New Castle, Pa.

FLANGES, PIPE, STEEL, LAP JOINT

Chicago Metal Mfg. Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.

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●Ladish Co., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, STEEL, SCREWED

●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
G & H Mfg. Co., Philadelphia, Pa.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
●Henry Valve Co., Melrose Park, Ill.
Hubbell Corp., Mundelein, Ill.
●Ladish Co., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
●Taylor Forge & Pipe Works, Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
U. S. Plug & Fitting Co., Wellington, O.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FLANGES, PIPE, STEEL, WELDING

Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Atlantic Steel Co., Atlanta, Ga.
●Bonney Forge & Tool Works, Allentown, Pa.
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
●Henry Valve Co., Melrose Park, Ill.
Hubbell Corp., Mundelein, Ill.
Key Co., East St. Louis, Ill.
●Ladish Co., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Roessing Mfg. Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
●Tube Turns, Inc., Louisville, Ky.
Vilter Mfg. Co., Milwaukee, Wis.
U. S. Plug & Fitting Co., Wellington, O.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FLARED FITTINGS, COPPER TUBE

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FLARED FITTINGS, STEEL TUBE

See Fittings, Steel Tube, Flared

FLARING TOOLS FOR TUBING

See Tools, Flaring

FLEXIBLE COUPLINGS

See Couplings, Flexible

FLEXIBLE DUCT CONNECTIONS

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FLEXIBLE METAL HOSE

See Hose, Metal and Fittings

FLOAT SWITCHES

See Switches, Float

FLOAT VALVES

See Valves, Float

FLOATS, STEAM TRAP, ETC.

●Armstrong Machine Wks., Three Rivers, Mich.
Bailey Co., Chas. M., San Francisco, Calif.
Chicago Float Works, Inc., Chicago, Ill.
●Crane Co., Chicago, Ill.
Cryer Trap & Valve Co., Inc., New York, N. Y.
Harris & Co., Arthur, Chicago, Ill.
●Hoffman Specialty Co., Indianapolis, Ind.
Kieley & Mueller, Inc., North Bergen, N. J.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Naugatuck Mfg. Co., Union City, Conn.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Owens & Co., Inc., Henry, Cranston, R. I.
Reichert Float & Mfg. Co., Toledo, O.
Reliance Gauge Column Co., Cleveland, O.
Sterling Engineering Mfg. Corp., Hyde Park, Mass.
●Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., New York, N. Y.
Watson & McDaniel Co., Philadelphia, Pa.
Williams Gauge Co., The, Pittsburgh, Pa.

FLOOR AND CEILING PLATES

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FLOW CONTROL VALVES

See Valves, Flow Control

FLOW METERS

See Meters, Flow

FLOW SWITCHES

See Switches, Flow

FORGED STEEL VALVES

See Valves, Forged Steel

FRESHENERS, AIR

See Adsorbers, Odor; Compounds, Air Freshening

FUEL ECONOMIZERS

See Economizers, Fuel

FUEL OIL UNITS

See Units, Fuel Oil

FURNACES, DUCT

See Heaters, Duct

FURNACES, WARM AIR, FOR INDUSTRIAL AND LARGE BUILDING CENTRAL HEATING

(Exclusively for duct distribution of air—300,000 Btu per hr and over) For direct fired heaters, which may be located in the space heated or may be used in central plant installations with duct distribution of the air, see the listings under Heaters, Air, Direct Fired.

Aladdin Heating Corp., Oakland, Calif.
American Foundry & Furnace Co., Bloomington, Ill.
Arcweld Mfg. Co., Inc., Seattle, Wash.
Bard Mfg. Co., Bryan, O.
Beck Engineering Combustion Kompany, St. Louis, Mo.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O
Campbell Co., E. K., Kansas City, Mo.
●Campbell Heating Co., Des Moines, Ia.
●Century Engineering Corp., Cedar Rapids, Ia.
Certified Furnace Co., Div. Stainless & Steel Products Co., St. Paul Minn.
●Hayes Furnace Mfg. & Supply Co., Los Angeles, Calif.
Hess Co., The, Chicago, Ill.
International Sales Co., San Francisco, Calif.
●Jackson & Church Co., Saginaw, Mich.
●Lee Corporation, Wilmington, Del.
Lennox Furnace Co., Columbus, O.
MaGirl Foundry & Furnace Co., Bloomington, Ill.
McPherson Furnace & Supply Co., Portland, Ore.
Meyer Furnace Co., The, Peoria, Ill.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.
Pennsylvania Furnace & Iron Co., Warren, Pa.
Quiet Automatic Oil Burner Corp., Newark, N. J.
●Ray Oil Burner Co., San Francisco, Calif.
Rosebraugh Co., W. W., Salem, Ore.
●Surface Combustion Corp., Toledo, O.

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Syncromatic Corp., Watertown, Wis.
U. S. Machine Corp., Lebanon, Ind.
United States Radiator Corp., Detroit, Mich.

FUSIBLE LINKS

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GAGE GLASSES

See Glasses, Gage

GAGE TESTERS

See Testers, Gage, Dead Weight

GAGES, AIR FILTER

Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
●Hays Corp., Michigan City, Ind.
Herbusch Corp., The, St. Louis, Mo. (Warning device)
Hill, E. Vernon, Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Meriam Instrument Co., The, Cleveland, O.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

GAGES, INDICATING, DRAFT

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Canton Stoker Corp., Canton, O.
Cleveland Fuel Equipment Co., Cleveland, O.
Cole-Sewell Engineering Co., St. Paul, Minn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
General Blower Co., Inc., Philadelphia, Pa.
●Hays Corp., Michigan City, Ind.
Hill, E. Vernon & Co., Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
●Perfex Corp., Milwaukee, Wis.
Precision Scientific Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

GAGES, INDICATING, PRESSURE

Acragage Corp., Milford, Conn.
Ashton Valve Co., Wrentham, Mass.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bristol Co., The, Waterbury, Conn.
Canton Stoker Corp., Canton, O.
●Cleveland Fuel Equipment Co., Cleveland, O.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dole Valve Co., The, Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Electro Products Laboratories, Inc., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Garden City Instruments, Inc., Chicago, Ill.
General Blower Co., Inc., Philadelphia, Pa.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
●Hays Corp., Michigan City, Ind.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
●Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Keller Tool Co., Grand Haven, Mich.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
●Mettler Co., Inc., The, Los Angeles, Calif.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
New York Air Valve Corp., Brooklyn, N. Y.
Norwalk Valve Co., South Norwalk, Conn.
●Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Stewart-Warner Corp., South Wind Div., Indianapolis, Ind.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
●Thrush & Co., H. A., Peru, Ind.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Watson-Stillman Co., Roselle, N. J.
Weksler Thermometer Corp., New York, N. Y.

GAGES, INDICATING, VACUUM

Acragage Corp., Milford, Conn.
Ashton Valve Co., Wrentham, Mass.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bristol Co., The, Waterbury, Conn.
Crosby Steam Gage Valve Co., Wrentham, Mass.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dole Valve Co., The, Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
●Hastings Instrument Co., Inc., Hampton, Va.
●Hays Corp., Michigan City, Ind.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
Hill, E. Vernon & Co., Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Norwalk Valve Co., South Norwalk, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
Stewart-Warner Corp., South Wind Div., Indianapolis, Ind.
Stokes Machine Co., F. J., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wallace & Tiernan, Inc., Newark, N. J.
Weksler Thermometer Corp., New York, N. Y.

GAGES, LIQUID LEVEL

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
American Injector Co., Detroit, Mich.
Applied Mechanics Co., Boston, Mass.
Automatic Control Co., St. Paul, Minn.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bearlee Products Co., Green Bay, Wis.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boston Auto Gage Co., Pittsfield, Mass.
Bristol Co., The, Waterbury, Conn.
Caldwell Co., W. E., Louisville, Ky.
●Crane Co., Chicago, Ill.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Defender Instrument and Regulator Co., St. Louis, Mo.
Detroit Brass & Malleable Works, Detroit, Mich.
Diamond Power Specialty Corp., Lancaster, O.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
●Frick Co., Waynesboro, Pa.

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Giannini & Co., Inc., G. M., Pasadena, Calif.
●Hays Corp., Michigan City, Ind.
●Henry Valve Co., Melrose Park, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Keckley Co., O. C., Chicago, Ill.
King Engineering Corp., Ann Arbor, Mich.
Klingerite, Inc., New York, N. Y.
Krueger Sentry Gauge Co., Green Bay, Wis.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Liquidometer Corp., Long Island City, N. Y.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Marshalltown Mfg. Co., Marshalltown, Ia.
Mel-Gauge Co., East Haven, Conn.
Mel Products Co., The, New Haven, Conn.
Meriam Instrument Co., The, Cleveland, O.
●Mettler Co., Inc., The, Los Angeles, Calif.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Morse-Smith-Morse, Inc., Watertown, Mass.
Nason Co., Clarkston, Mich.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Oil Equipment Mfg. Corp., New Haven, Conn.
Penberthy Injector Co., Detroit, Mich.
Petrometer Corp., Long Island City, N. Y.
●Powell Co., Wm., Cincinnati, O.
Reliance Gauge Column Co., Cleveland, O.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Stewart-Warner Corp., South Wind Div., Indianapolis, Ind.
Swift Lubricator Co., Elmira, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wallace & Tiernan Co., Newark, N. J.
Williams Gauge Co., The, Pittsburgh, Pa. (Water)
Wright-Austin Co., Detroit, Mich.
●Yarnall-Waring Co., Philadelphia, Pa.

GAGES, OIL TANK

Boston Auto Gage Co., Pittsfield, Mass.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
King Engineering Corp., Ann Arbor, Mich.
Krueger Sentry Gauge Co., Green Bay, Wis.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Liquidometer Corp., Long Island City, N. Y.
Mel-Gauge Co., East Haven, Conn.
Penberthy Injector Co., Detroit, Mich.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scully Signal Co., Cambridge, Mass.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
Viking Pump Co., Cedar Falls, Ia.

GALVANIZED SHEETS

See Sheets, Steel, Galvanized

GALVANNEALED SHEETS

See Sheets, Steel, Galvannealed

GAS BURNERS

See Burners, Gas

GAS ENGINES

See Engines, Gas

GAS FIRED RADIATORS

See Radiators, Gas Fired

GAS PRESSURE REGULATORS

See Regulators, Pressure, Gas

GAS VENT AND FLUE PIPE

See Pipe and Fittings, Gas Vent and Flue

GAS VOLUME METERS

See Meters, Volume, Air and Gas

GASKETS

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill. (Felt, rubber)
Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Akron Metallic Gasket Co., Akron, O.
Apha Metals, Inc., Brooklyn, N. Y.
American Felt Co., Glenville, Conn.
Anchor Packing Co., Philadelphia, Pa. (Asbestos)
●Armstrong Cork Co., Lancaster, Pa., (Cork & cork composition)
Baldwin Belting, Inc., New York, N. Y.
Belmont Packing & Rubber Co., Philadelphia, Pa.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y. (Lead)
Brady Co., W. H., Chippewa Falls, Wis.
●Chase Brass & Copper Co., Waterbury, Conn. (Brass and copper)
Chesterton Co., A. W., Everett, Mass.
Chicago Gasket Co., Chicago, Ill.
Chicago-Wilcox Mfg. Co., Chicago, Ill.
Clow & Sons, James B., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Continental Rubber Wks., Erie, Pa.
●Crane Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y. (Asbestos)
Durabla Mfg. Co., New York, N. Y. (Asbestos fibre)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Endura Mfg. Corp., Quakertown, Pa. (Paper, fibre)
Excelsior Leather Washer Mfg. Co., Rockford, Ill.
Federated Metal Div., American Smelting & Refining Co., New York, N. Y.
Felt Products Mfg. Co., Chicago, Ill. (Heat and oil resisting)
Felters Company, The, Boston, Mass.
Flexitallic Gasket Co., Camden, N. J. (Metal, asbestos)
Flexlock Corp., Akron, O.
Garlock Packing Co., Palmyra, N. Y.
Gates Rubber Co., The, Denver, Colo.
Gatke Corp., Chicago, Ill.
General Electric Co., Chemical Dept., Pittsfield, Mass.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
●Grant Wilson Inc., Chicago, Ill. (asbestos)
Graton & Knight Co., Worcester, Mass. (Leather)
Greene, Tweed & Co., North Wales, Pa.
Houghton & Co., E. F., Philadelphia, Pa. (Leather)
Johns-Manville, New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
Klingerit, Inc., New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J. (Metal, metal asbestos)
Mortell Co., J. W., Kankakee, Ill.
National Engineering Products, Inc., Washington, D. C. (Plastic)
National Lead Co., New York, N. Y. (lead)
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber and asbestos)
Resistoflex Corp., Belleville, N. J.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
Schieren Co., Chas. A., New York, N. Y.
Sponge Rubber Products Co., Shelton, Conn.
Steel Improvement & Forge Co., Cleveland, O.
Stokes Molded Products, Inc., Trenton, N. J. (Hard rubber)
Technical Ply-Woods, Chicago, Ill.
Thermoid Co., Trenton, N. J.
●Union Asbestos & Rubber Co., Chicago, Ill.
United States Gasket Co., Camden, N. J.
United States Rubber Co., New York, N. Y. (Rubber, asbestos)
United States Stoneware Co., New York, N. Y.
Western Felt Wks., Chicago, Ill. (Felt)
Zimmerman Packing Co., Cincinnati, O. (also gasket cutters)

GASOLINE FIRED HEATERS

See Heaters, Gasoline Fired

GAS VENT AND FLUE PIPE AND FITTINGS

See Pipe and Fittings, Gas Vent and Flue

GATES, BLAST

Allington & Curtis Mfg. Co., Saginaw, Mich.
●Bayley Blower Co., Milwaukee, Wis.
Berger Bros., Co., Philadelphia, Pa.
●Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
●Clarage Fan Co., Kalamazoo, Mich.
Day Co., The, Minneapolis, Minn.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Kirk & Blum Mfg. Co., Cincinnati, O.
Maysteel Products, Inc., Milwaukee, Wis.
Newcomb-Detroit Co., Detroit, Mich.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Rockwell Co., W. S., Fairfield, Conn.
Spencer Turbine Co., Hartford, Conn.
Thermix Corp., The, Greenwich, Conn.
Western Blower Co., Seattle, Wash.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.

GENERATORS, STEAM, ELECTRIC

Bigelow Co., The, New Haven, Conn.
Custom Engrg. Co., Los Angeles, Calif.
Livingstone Engineering Co., Worcester, Mass.

GLASS, HEAT ABSORBING

See Windows, Heat Insulating

GLASS PIPE

See Pipe, Glass

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GLASSES, GAGE

Bache, Semon & Co., New York, N. Y.
Chicago Specialty Mfg. Co., Chicago, Ill.
Corning Glass Works, Corning, N. Y.
Daigger & Co., A., Chicago, Ill.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Brass & Malleable Works, Detroit, Mich.
Diamond Power Specialty Corp., Lancaster, O.
●Henry Valve Co., Melrose Park, Ill.
Klingerit, Inc., New York, N. Y.
Libbey-Owens-Ford Glass Co., Toledo, O.
Lunkenheimer Co., Cincinnati, O.
New York Air Valve Corp., Brooklyn, N. Y.
Penberthy Injector Co., Detroit, Mich.
Reliance Gauge Column Co., Cleveland, O.
●Sarco Co., Inc., New York, N. Y.
Swift Lubricator Co., Elmira, N. Y.

GLASSES, SIGHT, FOR PIPE LINES

American District Steam Co., North Tonawanda, N. Y.
Bowser, Inc., Fort Wayne, Ind.
Cee-Kleer Products Co., Cincinnati, O.
Cochrane Corp., Philadelphia, Pa.
Corning Glass Works, Corning, N. Y.
Fischer & Porter Co., Hatboro, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Libbey-Owens-Ford Glass Co., Toledo, O.
●Mueller Brass Co., Port Huron, Mich.
O P W Corp., Cincinnati, O.
Penberthy Injector Co., Detroit, Mich.
●Powell Co., Wm., The, Cincinnati, O.
Remco, Inc., Zelienople, Pa. (for refrigerant lines)
Sarco Co., Inc., New York, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Superior Valve & Fittings Co., Pittsburgh, Pa.
Swift Lubricator Co., Elmira, N. Y.
●Webster & Co., Warren, Camden, N. J.

GLOBE VALVES

See Valves, Globe

GLYCOL VAPORIZERS

See Units, Sterilizing, Air

GOVERNORS, PUMP

Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Boylston Steam Specialty Co., Chicago, Ill.
Burrows Mfg. Co., F. A., York, Pa.
●Cash Co., A. W., Decatur, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Hagan Corp., Pittsburgh, Pa.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
●Swartwout Co., Cleveland, O.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
●Webster & Co., Warren, Camden, N. J.
Williams Gauge Co., The, Pittsburgh, Pa.

GRILLES

See also Diffusers; Panels, Perforated, for Air Diffusion; Registers

A & A. Register Co., Cleveland, O.
●A-J Mfg. Co., Kansas City, Mo.
Acme Mfg. Co., Holmesburg, Philadelphia, Pa.
Air Control Products, Inc., Coopersville, Mich.
Alton Mfg. Co., Dallas, Tex.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
●Auer Register Co., Cleveland, O.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
Beckley Perforating Co., Garwood, N. J.
Best Register Co., Milwaukee, Wis.
Central Wire & Iron Works, Des Moines, Ia.
Char-Gale Mfg. Co., Minneapolis, Minn.
Controlair Mfg. Co., Los Angeles, Calif.
Crown Iron Works, Minneapolis, Minn.
Decatur Iron & Steel Co., Decatur, Ala.
Diamond Mfg. Co., Wyoming, Pa.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Holland, Mich.
●Hendrick Mfg. Co., Carbondale, Pa.
●Independent Register Co., Cleveland, O.
Jamieson Mfg. Co., Dallas, Tex.
Johnston & Chapman Co., Chicago, Ill.
Lima Register Co., The, Lima, O.
Lockjoint Wood Products Co., Wichita, Kans. (Wood)
Louvra Corp., The, Union, N. J.
Manhattan Perforated Metal Co., Inc., Long Island City, N. Y.
Martin Metal Products Corp., Ferndale, Mich.
Metal Carrier Corp., Grand Rapids, Mich.
Midco Register Corp., St. Paul, Minn.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mundt & Sons, Charles, Jersey City, N. J.
Palmer Mfg. Corp., Phoenix, Ariz.
●Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Reliable Perforating Co., Chicago, Ill.
Rock Island Register Co., Rock Island, Ill.
Smith Co., J. B., Philadelphia, Pa.
●Standard Stamping & Perforating Co., Chicago, Ill.
Stewart Mfg. Co., Inc., Cedar Grove, N. J.
●Titus Mfg. Corp., Waterloo, Iowa.
●Tuttle & Bailey, Inc., New Britain, Conn.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Register Co., Battle Creek, Mich.
Utility Appliance Corp., Beverly Hills, Calif.
Viking Mfg. Corp., Cleveland, O.
Western Wire & Iron Works, Inc., Chicago, Ill. (metal)
Wickwire Spencer Steel, Div. of Colorado Fuel & Iron Corp., New York, N. Y.
Young Regulator Co., Cleveland, O.

GUNS AND POTS, SMOKE AND SMUDGE, FOR TESTING AIR MOVEMENT

Hill, E. Vernon & Co., Chicago, Ill.
Mine Safety Appliances Co., Pittsburgh, Pa.
●Newman Co., Inc., I. C., New York, N. Y. **(smoke containers)**
Pains Fireworks Display Co., New York, N. Y.
Unexcelled Chemical Corp., New York, N. Y.

HAND SHEARS

See Shears and Snips, Hand

HANGERS OR BRACKETS, RADIATOR

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Arjac Products, Inc., Rochester, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Carpenter & Paterson, Inc., East Boston, Mass.
Carty & Moore Engineering Co., Detroit, Mich.
Crawford Co., Chicago, Ill.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Gateway Engineering Co., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
Hartmann Co., Chas., Brooklyn, N. Y.
Healy Ruff Co., St. Paul, Minn.
Jennison Co., Fitchburg, Mass. (Adjustable radiator foot rest)
National Radiator Co., The, Johnstown, Pa.
Unistrut Products Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

HANGERS AND SUPPORTS, DUCT

Acme Mfg. Co., Philadelphia, Pa.
Excelsior Steel Furnace Co., The, Chicago, Ill.
Hexdall Co., A. M., Morris, Ill.
Moore Inc., Goodloe E., Danville, Ill.
Powder Power Tool Corp., Portland, Ore.
Standard Furnace Supply Co., Omaha, Neb.
●Ramset Fasteners, Inc., Cleveland, O.
United Industries, Madison, Wis. (for use with precast concrete joists)
Unistrut Products Co., Chicago, Ill.
Velocity Power Tool Co., Pittsburgh, Pa. (cartridge stud driver)

HANGERS AND SUPPORTS, PIPE

American District Steam Co., North Tonawanda, N. Y.
Atlantic Steel Co., Atlanta, Ga.
Bergen Genspring Corp., New York, N. Y. (variable spring)
Carpenter & Paterson, Inc., East Boston, Mass.
●Crane Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
●Frick Co., Waynesboro, Pa.
G & H Mfg. Co., Philadelphia, Pa. (hook)

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Gateway Engineering Co., Chicago, Ill.
●General Fittings Co., Providence, R. I. (strap hangers)
Genspring, Inc., New York, N. Y.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Iwan Brothers, Inc., South Bend, Ind.
●Korfund Co., Inc., Long Island City, N. Y.
Kynex Co., New York, N. Y. (for radiant heating)
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Minerallac Electric Co., Chicago, Ill.
Moore Inc., Goodloe E., Danville, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Paine Co., Chicago, Ill.
Piping Specialties, Inc., New York, N. Y. (anchor and guide for expansion joints)
Powder Power Tool Corp., Portland, Ore.
Power Piping Div., Blaw Knox Construction Co., Pittsburgh, Pa.
●Ramset Fasteners, Inc., Cleveland, O. (conduit clips)
Ravena Iron Co., Ravena, N. Y. (hook plates)
Reintjes Co., Geo. P., Kansas City, Mo.
●Ric-wiL Co., Cleveland, O.
●Ritter Pattern & Casting Co., New York, N. Y. (jack type adjustable tunnel stanchion)
Rockwood Sprinkler Co., Worcester, Mass.
Roessing Mfg. Co., Pittsburgh, Pa.
Russell Mfg. Co., John M., Naugatuck, Conn.
Titchener, E. H. & Co., Binghamton, N. Y. (wire staples for copper & brass tubing)
Truscon Steel Co., Youngstown, O.
Unistrut Products Co., Chicago, Ill.
United Industries, Madison, Wis. (for use with precast concrete joists)
Velocity Power Tool Co., Pittsburgh, Pa. (cartridge stud driver)
●Walworth Co., New York, N. Y.
Western Wire Products Co., St. Louis, Mo. (wire pipe hooks and perforated hanger iron)

HARD RUBBER PIPE AND FITTINGS

See Pipe, Hard Rubber; Fittings, Pipe, Hard Rubber

HEADERS, WELDED

●Acme Industries, Inc., Jackson, Mich.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
Buffalo Tank Corp., Newark, N. J.
Chicago Nipple Mfg. Co., Cicero, Ill.
Clow & Sons, James B., Chicago, Ill.
Cobra Pipe & Coil Co., Inc., Elmwood, Conn.
Columbian Steel Tank Co., Kansas City, Mo.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Crane Co., Chicago, Ill.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Fluor Corp., Ltd., The, Los Angeles, Calif.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
International Engineering Wks., Inc., Framingham, Mass.
Kellogg Co., M. W., The, New York, N. Y.
Lumsden & Van Stone Div. of Midwest Piping & Supply Co., South Boston, Mass.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
Ohio Pipe Bending & Mach. Co., Cleveland, O.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw-Knox Co., Pittsburgh, Pa.
Pypon Co., Pittsburgh, Pa. (stainless steel)
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
●Rempe Co., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Shaw Co., Benjamin F., Wilmington, Del.
Shaw Kendall Engineering Co., Toledo, O.
Vilter Mfg. Co., Milwaukee, Wis.
Western Piping & Engineering Co., San Francisco, Calif.
Whitlock Mfg. Co., Hartford, Conn.

HEADS, EXHAUST, FOR PIPE LINES

Anderson Co., V. D., The, Cleveland, O.
Centrifix Corp., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
Dickinson, Aeolus, Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Hoppes Mfg. Co., Inc., Springfield, O.
●Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
Wright-Austin Co., Detroit, Mich.

HEADS, SPRINKLER, FOR FIRE PROTECTION

●Grinnell Co., Inc., Providence, R. I.
Hoogman Mfg. Co., Taunton, Mass.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.

HEAT EXCHANGERS

See Chillers, Water; Condensers, Refrigerating; Exchangers, Heat; Surface, Cooling; Surface, Heating

HEAT PUMPS

See Units, Air Conditioning, Reverse Refrigeration Cycle

HEATERS, AIR, DIRECT FIRED, COAL

Campbell Co., E. K., Kansas City, Mo.
●Campbell Heating Co., Des Moines, Ia.
●Johnson Heater Corp., Saugas, Mass.
●Lee Corporation, Wilmington, Del.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.

HEATERS, AIR, DIRECT FIRED, GAS, CENTRIFUGAL FAN TYPE

For Furnaces for Central Plant Installation EXCLUSIVELY for Duct Distribution of the Air, See the Listing Under Furnaces

●Airtherm Mfg. Co., St. Louis, Mo.
American Foundry & Furnace Co., Bloomington, Ill.
American Furnace Co., St. Louis, Mo.
Auburn Burner Co., Auburn, Ind.
Automatic Gas Equipment Co., Pittsburgh, Pa.
Campbell Co., E. K., Kansas City, Mo.
●Campbell Heating Co., Des Moines, Ia.
Chicago Steel Furnace Co., Chicago, Ill.
●Dravo Corp., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
●General Gas Light Co., Kalamazoo, Mich.
Hastings Air Conditioning Co., Inc., Hastings, Neb.
International Sales Co., San Francisco, Calif.
●Jackson & Church Co., Saginaw, Mich.
●Johnson Heater Corp., Saugas, Mass.
Kilbury Mfg. Co., Inc., Lawndale, Calif.
●Lee Corporation, Wilmington, Del.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Nat Corp., Kansas City, Mo.
●National Heater Co., St. Paul, Minn.
Newcomb-Detroit Co., Detroit, Mich.
●Norge Heat Div., Borg-Warner Corp., Detroit, Mich.
Norman Products Co., Inc., Columbus, O.
●Olson & Co., Arthur A., Canfield, O.
Payne Furnace Div., Affiliated Gas Equipment Inc., Monrovia, Calif.
Prat-Daniel Corp., East Port Chester, Conn.
●Reznor Mfg. Co., Mercer, Pa.
●Surface Combustion Corp., Toledo, O.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Beverly Hills, Calif.
Zink Co., John, Tulsa, Okla.

HEATERS, AIR, DIRECT FIRED, OIL, FLOOR TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
American Foundry & Furnace Co., Bloomington, Ill.
Campbell Co., E. K., Kansas City, Mo.
●Campbell Heating Co., Des Moines, Ia.
Chicago Steel Furnace Co., Chicago, Ill.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
●Johnson Heater Corp., Saugas, Mass.
●Lee Corporation, Wilmington, Del.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.
Prat-Daniel Corp., East Port Chester, Conn.
Ross Engineering Corp., J. O., New York, N. Y.

HEATERS, AIR, DIRECT FIRED, OIL, PORTABLE, FOR INDUSTRIAL SPACE HEATING

Fageol Heat Machine Co., Detroit, Mich.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.
Prat-Daniel Corp., East Port Chester, Conn.
Quiet Automatic Oil Burner Corp., Newark, N. J.

HEATERS, AIR, DIRECT FIRED, OIL, SUSPENDED TYPE

Air Conditioning Engineering Co., Cambridge, Mass.

● Advertisement in this issue. See Index to Advertisers, page 128d

●Airtherm Mfg. Co., St. Louis, Mo.
Auburn Burner Co., Auburn, Ind.
American Furnace Co., St. Louis, Mo.
Cox Mfg. Co., Ridgeville, Ind.
Campbell Co., E. K., Kansas City, Mo.
Chicago Steel Furnace Co., Chicago, Ill.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Harvey-Whipple, Inc., Springfield, Mass.
●Jackson & Church Co., Saginaw, Mich.
●Lee Corp., Wilmington, Del.
●National Heater Co., St. Paul, Minn.
●Norge Heat Div., Borg-Warner Corp., Detroit, Mich.
●Olson & Co., Arthur A., Canfield, O.
OverHead Heaters, Inc., Detroit, Mich.
Prat-Daniel Corp., East Port Chester, Conn.
Quiet Automatic Oil Burner Corp., Newark, N. J.
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.

HEATERS, CONVECTION

See Radiation, Convection Type

HEATERS, DUCT, ELECTRIC

Brown Fintube Co., The, Elyria, O.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Despatch Oven Co., Minneapolis, Minn.
Electromode Corp., Rochester, N. Y.
Falcon Equipment Co., New Brighton, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Kilbury Mfg. Co., Inc., Lawndale, Calif.
Martin-Quaid Co., Philadelphia, Pa.
Tenney Engineering, Inc., Newark, N. J.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, DUCT, GAS

Allan Engineering Co., Dallas, Tex.
Automatic Gas Equipment Co., Pittsburgh, Pa.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
●General Gas Light Co., Kalamazoo, Mich.
Great National Air Conditioning Corp., Oklahoma City, Okla.
●Hayes Furnace Mfg. & Supply Co., Los Angeles, Calif.
International Sales Co., San Francisco, Calif.
Kehm Corp., The, Chicago, Ill.
Meyer Furnace Co., The, Peoria, Ill.
Naco Mfg. Co., Huntington Park, Calif.
Norman Products Co., Inc., Columbus, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Payne Furnace Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
●Reznor Mfg. Co., Mercer, Pa.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
●Surface Combustion Corp., Toledo, O.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Beverly Hills, Calif.

HEATERS, FEEDWATER

See Deaerators

HEATERS, GASOLINE FIRED (FOR AIRCRAFT AND PORTABLE GROUND USE)

Drayer & Hanson, Inc., Los Angeles, Calif.
Fluid Heat Div., Anchor Post Products Inc., Baltimore, Md.
Stewart-Warner Corp., South Wind Div., Indianapolis, Ind.
●Surface Combustion Corp., Toledo, O.

HEATERS, INDIRECT, SUBMERGED

American District Steam Co., North Tonawanda, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Brown Fintube Co., Elyria, O.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Graham Mfg. Co., Inc., New York, N. Y.
Lindy Heaters, Inc., New York, N. Y.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Penberthy Injector Co., Detroit, Mich.
Richmond Engineering Co., Inc., Richmond, Va.
Sims Co., Erie, Pa.
●Superior Combustion Industries, Inc., Detroit, Mich.
●Taco Heaters, Inc., Providence, R. I.
Western Blower Co., Seattle, Wash.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, OIL

See Preheaters, Fuel Oil: Units, Fuel Oil, Heating, Pumping and Straining

HEATERS, RADIATION, FOR SUPPLYING HOT WATER RADIATION FROM STEAM BOILER

●Bell & Gossett Co., Morton Grove, Ill.

HEATERS, STEAM JET, FOR LIQUIDS

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Duriron Co., Inc., The, Dayton, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Penberthy Injector Co., Detroit, Mich.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Sims Co., Erie, Pa.

HEATERS, STRIP AND IMMERSION, ELECTRIC

American Instrument Co., Silver Spring, Md.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Falcon Equipment Co., New Brighton, Pa.
●Fluid Systems, Inc., New Haven, Conn.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Martin-Quaid Co., Philadelphia, Pa.
Red Spot Electric Co., Tacoma, Wash.
Titan Mfg. Co., Buffalo, N. Y.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, SUSPENDED, RADIANT, ELECTRIC

General Electric Co., Apparatus Dept., Schenectady, N. Y.
Trent, Inc., Philadelphia, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, SUSPENDED, RADIANT, GAS FIRED

Day & Night Div., Affiliated Gas Equipment, Inc., Monrovia, Cali
Nat Corp., Kansas City, Mo.
●Olson & Co., Arthur A., Canfield, O.
Power Engineering Co., Chicago, Ill.

HEATERS, UNIT, ELECTRIC HEATING ELEMENT

Electromode Corp., Rochester, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Kilbury Mfg. Co., Inc., Lawndale, Calif.
Lintern C., Berea, O.
Martin-Quaid Co., Philadelphia, Pa.
Meco, Inc., Portland, Ore.
Red Spot Electric Co., Tacoma, Wash.
Royal Heaters, Inc., Alhambra, Calif.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.
Wing Mfg. Co., L. J., Linden, N. J.

HEATERS, UNIT, GAS, PROPELLER FAN TYPE

Adams Mfg. Co., Cleveland, Ohio
Allan Engineering Co., Dallas, Tex.
American Blower Corp., Detroit, Mich.
American Furnace Co., St. Louis, Mo.
Automatic Gas Equipment Co., Pittsburgh, Pa.
Barwick Mfg. Corp., Wichita, Kan.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O
●Carrier Corp., Syracuse, N. Y.
Clow & Sons, James B., Chicago, Ill.
Coroaire Heater Corp., The, Cleveland, O.
●General Gas Light Co., Kalamazoo, Mich.
Hastings Air Conditioning Co., Hastings, Neb.
International Sales Co., San Francisco, Calif.
●Ilg Electric Ventilating Co., Chicago, Ill.
●Jackson & Church Co., Saginaw, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lennox Furnace Co., The, Marshalltown, Ia.
●Modine Mfg. Co., Racine, Wis.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Nat Corp., Kansas City, Mo.
National Radiator Co., The, Johnstown, Pa.
Norman Products Co., Inc., Columbus, O.
Palmer Mfg. Corp., Phoenix, Ariz.
●Reznor Mfg. Co., Mercer, Pa.
Roberts-Gordon Appliance Corp., Buffalo, N. Y.
Sonner Burner Co., Winfield, Kan.
Sterling Radiator Co., Inc., Westfield, Mass.
●Surface Combustion Corp., Toledo, O.
Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Radiator Corp., Detroit, Mich.
Utility Appliance Corp., Beverly Hills, Calif.
●Wing Mfg. Co., L. J., Linden, N. J.
Zink Co., John, Tulsa, Okla.

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HEATERS, UNIT, STEAM AND HOT WATER, CABINET TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
American Thermal Industries, Inc., Detroit, Mich.
Brown Products Co., Forest Hills, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Dunham Co., C. A., Chicago, Ill.
Hastings Air Conditioning Co., Hastings, Neb.
●McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Young Radiator Corp., Racine, Wis.

HEATERS, UNIT, STEAM AND HOT WATER, CENTRIFUGAL FAN TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
American Thermal Industries, Inc., Detroit, Mich.
●Bayley Blower Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Brown Products Co., Forest Hills, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
●Carrier Corp., Syracuse, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Dunham Co., C. A., Chicago, Ill.
Hastings Air Conditioning Co., Hastings, Neb.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●McQuay, Inc., Minneapolis, Minn.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●New York Blower Co., Chicago, Ill.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wilson Engineering Corp., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
●Young Radiator Co., Racine, Wis.

HEATERS, UNIT, STEAM AND HOT WATER, PROPELLER FAN TYPE, HORIZONTAL BLOW

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
Beacon-Morris Corp., Boston, Mass.
Berns Mfg. Co., Chicago, Ill.
●Bishop & Babcock Mfg. Co., Cleveland, O.
●Buffalo Forge Co., Buffalo, N. Y.
●Carrier Corp., Syracuse, N. Y.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
●Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Hartzell Propeller Fan Co., Piqua, O.
●Ilg Electric Ventilating Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Kisco Boiler & Engineering Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
●McQuay, Inc., Minneapolis, Minn.
Merchant & Evans Co., Philadelphia, Pa.
●Modine Mfg. Co., Racine, Wis.
●Muckle Mfg. Co., Owatonna, Minn.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●New York Blower Co., Chicago, Ill.
Power Engineering Co., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Radiator Corp., Detroit, Mich.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wilson Engineering Corp., Chicago, Ill.
●Wing Mfg. Co., L. J., Linden, N. J.
●Young Radiator Co., Racine, Wis.

HEATERS, UNIT, STEAM AND HOT WATER, PROPELLER FAN TYPE, VERTICAL BLOW

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
Beacon-Morris Corp., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.
●Buffalo Forge Co., Buffalo, N. Y.
●Carrier Corp., Syracuse, N. Y.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
●Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●Grinnell Co., Inc., Providence, R. I.
●McCord Corp., Detroit, Mich.
●McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●New York Blower Co., Chicago, Ill.
Power Engineering Co., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Radiator Corp., Detroit, Mich.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.
●Young Radiator Co., Racine, Wis.

HEATERS, VENTILATION

See Surface, Finned, Heating; Ventilators, Roof, Fan; Ventilators, Unit; Surface, Finned, Heating; Ventilators, Roof, Fan

HEATERS, WALL CIRCULATING, GAS FIRED

Coroaire Heater Corp., The, Cleveland, Ohio
Mission Appliance Corp., Hawthorne, Calif.
Payne Furnace Div., Affiliated Gas Equipment Inc., Monrovia, Calif.
Royal Heaters, Inc., Alhambra, Calif.
Stewart-Warner Corp., South Wind Div., Indianapolis, Ind.

HEATERS, WATER, AIR-TANKLESS

Tankless Water Heater and Compression Tank Combined

●Bell & Gossett Co., Morton Grove, Ill.
●General Fittings Co., Providence, R. I.
●Taco Heaters, Inc., Providence, R. I.

HEATERS, WATER, CAST IRON, COAL FIRED

Adams Co., The, Dubuque, Ia.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Burnham Corp., Boiler Div., Irvington, N. Y.
Peerless Heater Div., The Eastern Foundry Co., Boyertown, Pa.
Prox Co., Inc., Frank, Terre Haute, Ind.
●Smith Co., Inc., H. B., The, Westfield, Mass.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Michigan City, Ind.

HEATERS, WATER, ELECTRIC

Allcraft Mfg. Co., Cambridge, Mass.
Auburn Burner Co., Auburn, Ind.
Bastian-Morley Co., Inc., LaPorte, Ind.
Clayton & Lambert Mfg. Co., Louisville, Ky.
●Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hanson-Gates Mfg. Co., Inc., Reading, Mass.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Hotpoint Inc., Chicago, Ill.
Hotstream Heater Co., Cleveland, O.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Livingstone Engineering Co., Worcester, Mass.
Martin-Quaid Co., Philadelphia, Pa.
Mission Appliance Corp., Hawthorne, Calif.
Red Spot Electric Co., Tacoma, Wash.
Rheem Mfg. Co., New York, N. Y.
Smith Corp., A. O., Milwaukee, Wis.
Trent Inc., Philadelphia, Pa.
Viking Mfg. Corp., Cleveland, O.
Westinghouse Electric Corp., Pittsburgh, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.
Wood Co., John, Conshohocken, Pa.
York-Shipley, Inc., York, Pa.

HEATERS, WATER, GAS FIRED

Alert Boiler & Mfg. Co., Detroit, Mich.
●Aldrich Co., Wyoming, Ill.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

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Auburn Burner Co., Auburn, Ind.
Bastian-Morley Co., Inc., LaPorte, Ind.
Birchfield Boiler, Inc., Tacoma, Wash.
Brown Products Co., Forest Hills, N. Y.
Bryant Corp., C. L., Cleveland, O.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Clayton & Lambert Mfg. Co., Louisville, Ky.
●Cleaver-Brooks Co., Milwaukee, Wis.
●Crane Co., Chicago, Ill.
Day & Night Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Dewey-Shepard Boiler Co., Indianapolis, Ind.
Duo-Therm Div., Motor Wheel Corp., Lansing, Mich.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Gold Top Heating, Inc., Butte, Mont.
Hanson-Gates Mfg. Co., Inc., Reading, Mass.
Heat Equipment not Inc., Chicago, Ill.
Hook & Ackerman, Inc., New York, N. Y.
Hotstream Heater Co., Cleveland, O.
Kehm Corp., The, Chicago, Ill.
Mission Appliance Corp., Hawthorne, Calif.
Montgomery Bros., San Francisco, Calif.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
Pittsburg Water Heater Co., Pittsburgh, Pa.
Rheem Mfg. Co., New York, N. Y.
Richmond Radiator Co., New York, N. Y.
Rotary Mfg. Co., Los Angeles, Calif.
Ruud Mfg. Co., Pittsburgh, Pa.
Sellers Engineering Co., Chicago, Ill.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Smith Corp., A. O., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
United States Radiator Corp., Detroit, Mich.
Viking Mfg. Corp., Cleveland, O.
Wood Co., John, Conshohocken, Pa.
York-Shipley, Inc., York, Pa.

HEATERS, WATER, INDIRECT

Akwa Heaters, Inc., New York, N. Y.
American District Steam Co., North Tonawanda, N. Y.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
●Bell & Gossett Co., Morton Grove, Ill.
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Ferguson & Lange Foundry Co., Chicago, Ill.
●General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Hook & Ackerman, Inc., New York, N. Y.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Kehm Corp., The, Chicago, Ill.
Lewis & Co., Joseph E., Baltimore, Md.
Lindy Heaters, Inc., New York, N. Y.
National Radiator Co., The, Johnstown, Pa.
Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Sellers Engineering Co., Chicago, Ill.
Sims Co., Erie, Pa.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, WATER, INDIRECT, COMBINATION TANK AND TANKLESS

●Bell & Gossett Co., Morton Grove, Ill.
Birchfield Boiler, Inc., Tacoma, Wash.
Burnham Corp., Boiler Div., Irvington, N. Y.
Carpenter Heating & Stoker Co., Cleveland, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Crotty Mfg. Corp., Long Island, N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Eclipse Fuel Enginering Co., Rockford, Ill.
General Fittings Co., Providence, R. I.
Heat Equipment not Inc., Chicago, Ill.
Hook & Ackerman, Inc., New York, N. Y.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Lindy Heaters, Inc., New York, N. Y.
Penberthy Injector Co., Detroit, Mich.
Richmond Engineering Co., Inc., Richmond, Va.
Sims Co., Erie, Pa.
●Taco Heaters, Inc., Providence, R. I.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, WATER, OIL FIRED

Aeroil Products Co., Inc., South Hackensack, N. J. (Portable)
●Air Devices, Inc., New York, N. Y.
●Aldrich Co., Wyoming, Ill.
Auburn Burner Co., Auburn, Ind.
Bastian-Morley Co., Inc., LaPorte, Ind.
Birchfield Boiler, Inc., Tacoma, Wash.
Brown Products Co., Forest Hills, N. Y.
●Century Engineering Corp., Cedar Rapids, Ia.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Clayton & Lambert Mfg. Co., Louisville, Ky.
●Cleaver-Brooks Co., Milwaukee, Wis.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Dewey-Shepard Boiler Co., Indianapolis, Ind.
Duo-Therm Div., Motor Wheel Corp., Lansing, Mich.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Electrol Burner Mfg. Co., Inc., Rutherford, N. J.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
Gold Top Heating, Inc., Butte, Mont.
Hanson-Gates Mfg. Co., Inc., Reading, Mass.
Heat Equipment not Inc., Chicago, Ill.
Hotstream Heater Co., Cleveland, O.
Johnson Co., S. T., Philadelphia, Pa.
Nu-Way Corp., The, Rock Island, Ill.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
Petroleum Heat & Power Co., Stamford, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Ray Oil Burner Co., San Francisco, Calif.
Reif-Rexoil, Inc., Buffalo, N. Y.
Rheem Mfg. Co., New York, N. Y.
Scott-Newcomb, Inc., St. Louis, Mo.
Shephard Heater Co., Inc., Terre Haute, Ind.
●Smith Co., Inc., H. B., The, Westfield, Mass.
United States Radiator Corp., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Viking Mfg. Corp., Cleveland, O.
York Electric and Machine Co., York, Pa.

HEATERS, WATER, STEAM, INSTANTANEOUS

●Aerco Corp., Englewood, New Jersey
Akwa Heaters, Inc., New York, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Coe Mfg. Co., Painesville, O.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Duffy Engrg. Co., Portland, Ore.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
●General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Graham Mfg. Co., Inc., New York, N. Y.
Hasco Valve & Machine Co., Milwaukee, Wis.
Howard Iron Wks. & Alberger Heater Div., Buffalo, N. Y.
International Engineering Wks., Inc., Framingham, Mass.
Johnson Corp., The, Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Lewis & Co., Joseph E., Baltimore, Md.
Lindy Heaters, Inc., New York, N. Y.
Marion Machine Foundry & Supply Co., Marion, Ind.
Montgomery Bros., San Francisco, Calif.
National Pipe Bending Co., New Haven, Conn.
O'Brien Steam Specialty Co., Inc., Syracuse, N. Y.
Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pick Mfg. Co., West Bend, Wis. (direct steam injection)
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Sims Co., Erie, Pa.
●Swartwout Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, WATER, STEAM, STORAGE

Akwa Heaters, Inc., New York, N. Y.
Alert Boiler & Mfg. Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Burnham Corp., Boiler Div., Irvington, N. Y.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dahlquist Mfg. Co., Inc., Div. of Process Engineering Inc., Somerville, Mass.
●Davis Engineering Corp., Elizabeth, N. J.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
●General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Hoppes Mfg. Co., Inc., Springfield, O.
Howard Iron Wks. & Alberger Heater Div., Buffalo, N. Y.
Johnson Corp., The, Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.

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●Kewanee Boiler Corp., Kewanee, Ill.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Manitowoc Engineering Wks., Manitowoc, Wis.
Marion Machine Foundry & Supply Co., Marion, Ind.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Penberthy Injector Co., Detroit, Mich.
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Rotary Mfg. Co., Los Angeles, Calif.
Schaub Engineering Co., Fred H., Chicago, Ill.
Sims Co., Erie, Pa.
Stout & Sons, David, St. Louis, Mo.
●Swartwout Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Vogt Machine Co., Henry, Louisville, Ky.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters Inc., New York, N. Y.

HEATERS, WATER, STEEL, COAL FIRED

Aeroil Products Co., Inc., South Hackensack, N. J. (Portable)
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Catskill Metal Works, Inc., Catskill, N. Y.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
Heat Equipment not Inc., Chicago, Ill.
International Engineering Wks., Inc., Framingham, Mass.
Johnston Bros., Inc., Ferrysburg, Mich.
●Kewanee Boiler Corp., Kewanee, Ill.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
●Terre Haute Boiler Works, Co., Terre Haute, Ind.

HEATING BOILERS

See Boilers, Heating

HEATING COILS

See Surface, Heating

HEATING SURFACE

See Surface, Heating

HOSE CLAMPS

See Clamps, Hose

HOSE, METAL, AND FITTINGS

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
American Metal Hose Branch, The American Brass Co., Waterbury, Conn.
Atlantic Metal Hose Co., Inc., New York, N. Y.
Brockway Co., Naugatuck, Conn.
Chicago Metal Hose Corp., Maywood, Ill.
Chiksan Co., Brea, Calif.
Everhot Products Co., Chicago, Ill.
Gil-Lair Products, Inc., Pasadena, Calif.
Johnson Metal Hose, Inc., Waterbury, Conn.
Norgren Co., C. A., Englewood, Colo.
Packless Metal Products Corp., New Rochelle, N. Y.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Seamlex Co., Inc., Long Island City, N. Y.
Techniflex Corp., Port Jervis, N. Y.
Titeflex, Inc., Newark, N. J.
United Metal Hose Co., Inc., Long Island City, N. Y.
●Zallea Brothers, Wilmington, Del.

HOSE, NON-METAL, AND FITTINGS

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
American Ventilating Hose Co., New York, N. Y.
Arrowhead Rubber Co., Downey, Calif.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Continental Rubber Works, Erie, Pa.
De Vilbiss Co., The, Toledo, O.
Flexible Tubing Corp., Guilford, Conn.
Gates Rubber Co., The, Denver, Colo.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hamilton Rubber Mfg. Corp., Trenton, N. J.
●Henry Valve Co., Melrose Park, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber and Tire Corp., Youngstown, O.
Resistoflex Corp., Belleville, N. J.
Roylyn, Inc., Glendale, Calif.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.
Weatherhead Co., The, Cleveland, O.

HOSE, VENTILATING

See Ducts and Duct Fittings, Prefabricated, Non-Metallic

HOT GAS DEFROSTING

See Systems, Hot Gas Defrosting for Refrigeration

HOT WATER HEATING SYSTEMS

See Systems, Heating, Hot Water

HOT WATER HEATING SYSTEMS, BALANCING ELBOWS FOR

See Elbows, Balancing, For Hot Water Heating System

HOT WATER PRESSURE REGULATORS

See Regulators, Pressure, Hot Water Heating Systems

HOUSINGS, FAN, CENTRIFUGAL

(Housing only—not complete fans)

●Bishop & Babcock Mfg. Co., Cleveland, O.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Metalcrafts Inc., Cincinnati, O.
●Clarage Fan Co., Kalamazoo, Mich.
Commercial Shearing & Stamping Co., Youngstown, O.
Detroit Stamping Co., Detroit, Mich.
Hastings Air Conditioning Co., Hastings, Neb.
Haveg Corp., Newark, Del. (plastic for corrosive fumes)
Lau Blower Co., Dayton, O.
Martin Fan & Blower Co., Chicago, Ill.
Maysteel Products, Inc., Milwaukee, Wis.
Northern Blower Co., Cleveland, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Revcor, Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Torit Mfg. Co., St. Paul, Minn.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utica Products, Inc., Utica, N. Y.
Viking Air Conditioning Corp., Cleveland, O.

HOUSINGS, FAN, PROPELLER

(Housings only—not complete fans)

Allen Ventilator Div., Production Planning Co., Rochester, Mich.
Cincinnati Metalcrafts Inc., Cincinnati, O.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Commercial Shearing & Stamping Co., Youngstown, O.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Haveg Corp., Newark, Del. (plastic for corrosive fumes)
Palmer Mfg. Corp., Phoenix, Ariz.
Revcor, Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.

HUMIDIFIERS, CENTRAL PLANT

●Air & Refrigeration Corp., New York, N. Y.
●American Blower Corp., Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Moistening Co., Providence, R. I.
●Armstrong Machine Wks., Three Rivers, Mich.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
●Carrier Corp., Syracuse, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Cleveland Humidifier Co., Cleveland, O.
●Farr Co., Los Angeles, Calif.
●Johnson Service Co., Milwaukee, Wis.
Little Giant Vaporizer Co., Inc., Oklahoma City, Okla. (vaporizers for humidifiers)
●McDonnell & Miller, Inc., Chicago, Ill.
Mellish & Murray Co., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
National Air Conditionng Inc., Johnstown, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
●Niagara Blower Co., New York, N. Y.
Parks-Cramer Co., Fitchburg, Mass.
●Powers Regulator Co., Skokie, Ill.
Roberson Co., L. N., Seattle, Wash.
●Trane Co., The, LaCrosse, Wis.
Viking Air Conditioning Corp., Cleveland, O.
Vilter Mfg. Co., Milwaukee, Wis.
●York Corp., York, Pa.

HUMIDIFIERS, DIRECT, SPRAY HEAD

American Moistening Co., Providence, R. I.
Anetsberger Bros., Inc., Northbrook, Ill.
●Armstrong Machine Works, Three Rivers, Mich.
Bahnson Co., Winston-Salem, N. C. (Centrifugal)
●Binks Mfg. Co., Chicago, Ill.
Blower Application Co., Milwaukee, Wis.
●Buffalo Forge Co., Buffalo, N. Y.
Drying Systems, Inc., Chicago, Ill.

●Grinnell Co., Inc., Providence, R. I.
●Maid-O'Mist, Inc., Chicago, Ill.
Manufacturers Machine Co., North Andover, Mass.
●Marley Co., Inc., The, Kansas City, Kans.
●Marlo Coil Co., St. Louis, Mo.
Murray Mfg. Co., D. J., Wausau, Wis.
Paasche Airbrush Co., Chicago, Ill.
Parks-Cramer Co., Fitchburg, Mass.
Pfening Co., Fred D., Columbus, O.
Rhode Island Humidifier & Ventilating Co., Boston, Mass.
Ross Sprinkler Co., Pasadena, Calif.
Somers, Inc., H. J., Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Supreme Electric Products Corp., Rochester, N. Y.
●Trane Co., The, LaCrosse, Wis.
Water Cooling Corp., New York, N. Y.

HUMIDIFIERS FOR RADIATORS AND CONVECTORS

Kauffman Air Conditioning Corp., St. Louis, Mo.
●Maid-O'-Mist, Inc., Chicago, Ill.
Skilbeck Mfg. Co., Kenosha, Wis.
Techtmann Industries, Inc., Milwaukee, Wis.

HUMIDIFIERS, RADIATOR VENT VALVE

G & H Mfg. Co., Philadelphia, Pa.
●Maid-O'Mist, Inc., Chicago, Ill.
Skilbeck Mfg. Co., Kenosha, Wis.

HUMIDIFIERS, UNIT, ROOM TYPE (Without Heating)

American Moistening Co., Providence, R. I.
●Armstrong Machine Wks., Three Rivers, Mich.
●Carrier Corp., Syracuse, N. Y.
Crowell & Dunn, Inc., New York, N. Y.
Daffin Mfg. Co., Lancaster, Pa.
Fresh'nd-Aire Co., Div. of Cory Corp., Chicago, Ill.
Health Trola Div., Excel Heating & Air Conditioning Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Little Giant Vaporizer Co., Inc., Oklahoma City, Okla.
Murray Mfg. Co., D. J., Wausau, Wis.
National Engineering & Mfg. Co., Kansas City, Mo.
Palmer Mfg. Corp., Phoenix, Ariz.
Somers, Inc., H. J., Detroit, Mich.
●Spraying Systems Co., Bellwood, Ill.
Standard Engineering Wks., Pawtucket, R. I.
Tempmaster Corp., Kansas City, Mo.
●United States Air Conditioning Corp., Minneapolis, Minn.
Walton Laboratories, Inc., Irvington, N. J.
Water Cooling Corp., New York, N. Y.

HUMIDIFYING RADIATORS

See Radiators, Humidifying

HUMIDISTATS

American Instrument Co., Silver Spring, Md.
American Moistening Co., Providence, R. I.
Autempco Corp., New York, N. Y.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Buensod-Stacey, Inc., New York, N. Y.
●General Controls Co., Glendale, Calif.
●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Parks-Cramer Co., Fitchburg, Mass.
Penn Controls, Inc., Goshen, Ind.
●Powers Regulator Co., Skokie, Ill.
Standard Engineering Wks., Pawtucket, R. I.
Walton Laboratories, Inc., Irvington, N. J.

HUMIDITY INDICATORS

See Indicator-Controllers, Relative Humidity; Psychrometers

HUMIDITY RECORDERS

See Recorders, Humidity

HUMIDITY AND TEMPERATURE CONTROLS

See Humidistats; Recorder-Controllers; Thermostats

HYDRAULIC PIPE PUSHERS

See Pushers, Pipe, Hydraulic

HYDRAULIC SPEED CHANGERS

See Changers, Speed, Hydraulic Coupling

HYGROMETERS

American Moistening Co., Providence, R. I.
Bristol Co., The, Waterbury, Conn.
Daigger & Co., A., Chicago, Ill.
Fee and Steinwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
Garden City Instruments, Inc., Chicago, Ill.
General Scientific Equipment Co., Philadelphia, Pa.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.
Will Corp., Rochester, N. Y.

HYGROSTATS

See Humidistats

IDENTIFICATION MARKERS (For Piping Services)

Brady Co., W. H., Chippewa Falls, Wis.
Western Lithograph Co., Los Angeles, Calif.

IMMERSION THERMOSTATS

See Thermostats, Immersion

INDICATING THERMOMETERS

See Thermometers, Indicating

INDICATOR-CONTROLLERS, PRESSURE

Automatic Control Co., St. Paul, Minn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Cooper Co., Clark, Palmyra, N. J.
Electro Products Laboratories, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
●Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Scientific Instrument Co., Detroit, Mich.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.

INDICATOR-CONTROLLERS, RELATIVE HUMIDITY

American Instrument Co., Silver Spring, Md.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
●Johnson Service Co., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.

INDICATOR-CONTROLLERS, TEMPERATURE

American Instrument Co., Silver Spring, Md.

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Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Cooper Co., Clark, Palmyra, N. J.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
General Electric Co., Meter & Instrument Dept., Schenectady, N. Y.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Illinois Engineering Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
●Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Smith Control & Instrument Corp., Palmyra, N. J.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wheelco Instruments Co., Chicago, Ill.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

INDICATORS, CARBON DIOXIDE, BOILER ROOM

For Portable CO₂ Analyzers, See Analyzers, Carbon Dioxide, Portable

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Davis Instruments, Div. of Davis Emergency Equipment Co., Inc., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Engelhard, Inc., Chas., Newark, N. J.
Ess Instrument Co., Bergenfield, N. J.
●Hays Corp., Michigan City, Ind.
Permutit Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

INDICATORS, DEW POINT

American Instrument Co., Silver Spring, Md.
Foxboro Co., Foxboro, Mass.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.

INDICATORS, FLOW

See Meters, Flow

INDICATORS, LIQUID LEVEL, BOILER AND TANK

Automatic Control Co., St. Paul, Minn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Boston Auto Gage Co., Pittsfield, Mass.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
B/W Controller Corp., Birmingham, Mich.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Brass & Malleable Works, Detroit, Mich.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
●Frick Co., Waynesboro, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Healy Ruff Co., St. Paul, Minn.
●Henry Valve Co., Melrose Park, Ill.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Magnetrol, Inc., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
●McDonnell & Miller, Inc., Chicago, Ill.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Penberthy Injector Co., Detroit, Mich.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Petrometer Corp., Long Island City, N. Y.
Reliance Gauge Column Co., Cleveland, O.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Swift Lubricator Co., Elmira, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
●Yarnall-Waring Co., Philadelphia, Pa.

INDICATORS, pH

Analytical Measurements, Inc., Chatham, N. J.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Madden & Co., P. E., Chicago, Ill.

INDICATORS, RELATIVE HUMIDITY

American Instrument Co., Silver Spring, Md.
American Moistening Co., Providence, R. I.
Fee and Stemwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Walton Laboratories, Inc., Irvington, N. J.

INDICATORS, SOUND LEVEL

General Electric Co., Apparatus Dept., Schenectady, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.

INDIRECT HEATING SURFACE

See Surface, Heating

INDIRECT WATER HEATERS

See Heaters, Water, Indirect

INDUSTRIAL AIR CONDITIONERS

See Units, Air Conditioning, Industrial Type

INDUSTRIAL DRYERS

See Dryers, Industrial

INJECTOR RECIRCULATORS FOR REFRIGERANTS

Phillips & Co., H. A., Chicago, Ill.

INSTANTANEOUS WATER HEATERS

See Heaters, Water, Steam, Instantaneous

INSULATING CONCRETE

See Concrete, Insulating

INSULATION, BOILER AND TANK

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
Alton Mineral Wool Insulation Co., St. Louis, Mo.
●Armstrong Cork Co., Lancaster, Pa. (85% Magnesia)
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bigelow Liptak Corp., Detroit, Mich.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Cork Import Corp., Englewood, N. J. (Corkboard)
Eagle-Picher Co., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa. (Magnesia)
Forty-Eight Insulations, Inc., Aurora, Ill.
●Grant Wilson Inc., Chicago, Ill.
Green Fire Brick Co., Mexico, Mo.
International Vermiculite Co., Girard, Ill.
Johns-Manville, New York, N. Y.
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Keasbey Co., Robert A., New York, N. Y. (Asbestos)
●Keasbey & Mattison Co., Ambler, Pa.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Co., St. Louis, Mo.
Lockport Cotton Batting Co., Lockport, N. Y.
Monsanto Chemical Co., Merimac Div., Boston, Mass.
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn and Steele, Inc., South Boston, Mass.
National Gypsum Co., Buffalo, N. Y. (Rock wool)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos and magnesia)
●Owens-Corning Fiberglas Corp., Toledo, O. (Blanket and board)
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.

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Plibrico Jointless Firebrick Co., Chicago, Ill.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Reflectal Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Blanket, block, cement)
Robinson Industries, Coleman, Mich. (expanded plastic)
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos, magnesia)
Sall Mountain Co., Hamilton, O.
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
Telsit Insulation Co., Bronx, N. Y.
●Union Asbestos & Rubber Co., Chicago, Ill.
United Cork Co., Kearney, N. J. (Cork)
United States Mineral Wool Co., South Milwaukee, Wis.
Walker Jamar Co., Duluth, Minn.
Western Mineral Products Co., Minneapolis, Minn.
Zonolite Co., Chicago, Ill. (plastic)

INSULATION, BUILDING

Acme Asbestos Covering & Flooring Co., Chicago, Ill. (Rock wool)
Air-O-Cel Co., Detroit, Mich.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
Alton Mineral Wool Insulation Co., St. Louis, Mo.
American Flange & Mfg. Co., Inc., New York, N. Y. (Metal sheets)
●American Hair & Felt Co., Chicago, Ill. (Hair felt)
●Armstrong Cork Co., Lancaster, Pa. (Corkboard, fibre board)
Bache & Co., Semon, New York, N. Y. (Glass wool)
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Rock wool)
Carney Co., Inc., The, Mankato, Minn.
Celotex Corp., The, Chicago, Ill.
Certain-teed Products Corp., Ardmore, Pa.
Chamberlin Co. of America, Detroit, Mich.
Cork Import Corp., Englewood, N. J. (Corkboard)
Cork Insulation Co., Inc., New York, N. Y. (Corkboard)
Dry-Zero Corp., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O. (Mineral wool, blankets, batts, granulated, loose)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Fir-tex Insulating Board Co., St. Helens, Ore. (Wood fibre-board)
Flintkote Co., The, New York, N. Y. (Glass wool)
General Insulating Products Co., Brooklyn, N. Y. (Rock wool)
Gustin-Bacon Mfg. Co., Kansas City, Mo.
Hogan & Co., Inc., C. T., New York, N. Y. (reflective)
●Infra Insulation, Inc., New York, N. Y. (reflective)
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn. (Wool fibre)
Insul-Wool Insulation Corp., Wichita, Kans.
International Vermiculite Co., Girard, Ill. (Loose fill)
Isoflex Corp., San Francisco, Calif.
Johns-Manville, New York, N. Y. (Rock wool and wood fibre-board)
Johnston Foil Mfg. Co., St. Louis, Mo. (Foil, aluminum, tin, lead)
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Kimberly-Clark Corp., Neenah, Wis.
Libbey-Owens-Ford Glass Co., Toledo, O.
Lockport Cotton Batting Co., Lockport, N. Y.
Masonite Corp., Chicago, Ill. (Blanket)
Mineral Insulation Co., Chicago Ridge, Ill. (Rock wool)
Multi-Cell Sales Corp., Minneapolis, Minn. (Blanket, quilted newspaper)
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn & Steele, Inc., South Boston, Mass.
National Gypsum Co., Buffalo, N. Y.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
●Owens-Corning Fiberglas Corp., Toledo, O.
Pacific Lumber Co., The, San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Plastergon Wall Board Co., Buffalo, N. Y. (Rigid board)
Poe Co., C. W., Cleveland, O.
Reflectal Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Rock, slag wool)
Reynolds Metals Co., Louisville, Ky.
Rock Fleece Co., El Paso, Tex.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
Russell Co., F. C., The, Cleveland, O.
Silvercote Products, Inc., Chicago, Ill.
Sprayo-Flake Co., Chicago, Ill.
Standard Asbestos Mfg. Co., Chicago, Ill. (Asbestos, hairfelt)
Stic-Klip Mfg. Co., Cambridge, Mass. (Insulation fasteners)
Tennessee Products and Chemical Corp., Nashville, Tenn.
United Cork Companies, Kearny, N. J. (Cork)
United States Gypsum Co., Chicago, Ill. (Wool and board)
United States Mineral Wool Co., South Milwaukee, Wis. (Mineral wool)
Universal Gypsum & Lime Co., Chicago, Ill. (Loose fill)
Western Mineral Products Co., Minneapolis, Minn.
Wilson & Co., Inc., Chicago, Ill. (Board)
Wood Conversion Co., St. Paul, Minn.
Zonolite Co., Chicago, Ill. (Loose fill)

INSULATION, DUCT, SOUND DEADENING

For Application Inside Duct

Baldwin-Hill Co., Trenton, N. J.
Celotex Corp., The, Chicago, Ill.
Dry-Zero Corp., Chicago, Ill.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felters Company, The, Boston, Mass.
●Grant Wilson, Inc., Chicago, Ill.
Gustin-Bacon Mfg. Co., Kansas City, Mo.
●Industrial Acoustics Co., New York, N. Y.
Insulite Div., Minnesota and Ontario Paper Co., Minneapolis, Minn.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Kimberly-Clark Corp., Neenah, Wis.
Lockport Cotton Batting Co., Lockport, N. Y.
Mortell Co., J. W., Kankakee, Ill.
●Owens-Corning Fiberglas Corp., Toledo, O.
Stic-Klip Mfg. Co., Cambridge, Mass. (Insulation fasteners)
Telsit Insulation Co., Bronx, N. Y.
Thompson & Co., Oakmont, Pa.
United States Rubber Co., New York, N. Y.
Western Felt Works, Chicago, Ill.
Zonolite Co., Chicago, Ill.

INSULATION, DUCT, THERMAL

Acme Asbestos Covering & Flooring Co., Chicago, Ill. (Asbestos)
Air-O-Cel Co., Detroit, Mich.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
American Flange & Mfg. Co., Inc., New York, N. Y.
●American Hair & Felt Co., Chicago, Ill. (Hair felt)
●Armstrong Cork Co., Lancaster, Pa. (Corkboard)
Arrowhead Rubber Co., Downey, Calif.
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J.
Bigelow Liptak Corp., Detroit, Mich.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Asbestos)
Celotex Corp., The, Chicago, Ill.
Cork Import Corp., Englewood, N. J. (Corkboard)
Cork Insulation Co., Inc., New York, N. Y. (Corkboard)
Dry-Zero Corp., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O. (Mineral wool blankets)
Ehret Magnesia Mfg. Co., Valley Forge, Pa. (Cork, magnesia, hair felt)
Felters Company, The, Boston, Mass. (Wool felt)
Fir-Tex Insulating Board Co., St. Helens, Ore. (Wood fibreboard)
Flintkote Co., The, New York, N. Y. (fibrated, asphalt spray-On)
General Insulating Products Co., Brooklyn, N. Y. (Acoustic rock wool)
●Grant Wilson Inc., Chicago, Ill.
Gustin-Bacon Mfg. Co., Kansas City, Mo.
Hinde & Dauch Paper Co., Sandusky, O.
●Infra Insulation, Inc., New York, N. Y.
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn. (Wood fibre)
International Vermiculite Co., Girard, Ill. (Block)
Isoflex Corp., San Francisco, Calif.
Johns-Manville, New York, N. Y. (Rock cork, asbestos)
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Keasbey Co., Robert A., New York, N. Y. (Asbestos and cork)
●Keasbey & Mattison Co., Ambler, Pa. (Asbestos)
Keystone Asphalt Products Co., Chicago, Ill.
Kimberly-Clark Corp., Neenah, Wis.
Lockport Cotton Batting Co., Lockport, N. Y.
Masonite Corp., Chicago, Ill.
Mineral Insulation Co., Chicago Ridge, Ill. (Rock wool)
Mortell Co., J. W., Kankakee, Ill.
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn and Steele, Inc., South Boston, Mass.
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos and wool felt)
●Owens-Corning Fiberglas Corp., Toledo, O. (Blanket)
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Reflectal Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Block, blanket)
Reynolds Metals Co., Louisville, Ky.
Rock Fleece Co., El Paso, Tex.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
Ruberoid Co., New York, N. Y. (Asbestos cellular and laminated sheets or blocks)
Sall Mountain Co., Hamilton, O. (Asbestos)
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell type)
Sprayo-Flake Co., Chicago, Ill.
Standard Asbestos Mfg. Co., Chicago, Ill. (Asbestos, hair felt)
Stic-Klip Mfg. Co., Cambridge, Mass. (Insulation fasteners)
Telsit Insulation Co., Bronx, N. Y.
●Union Asbestos & Rubber Co., Chicago, Ill.
United Cork Companies, Kearny, N. J. (Cork)
United States Mineral Wool Co., South Milwaukee, Wis.
Western Felt Wks., Chicago, Ill. (Felt)
Wilson & Co., Inc., Chicago, Ill.
Zonolite Co., Chicago, Ill. (plastic)

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INSULATION FASTENERS

See Fasteners, Insulation

INSULATION, FINISHING CEMENT

Baldwin-Hill Co., Trenton, N. J.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
●Grant Wilson, Inc., Chicago, Ill.
Keasbey Co., Robert A., New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
Ruberoid Co., New York, N. Y.

INSULATION, PIPE

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
American District Steam Co., North Tonawanda, N. Y. (Underground)
●American Hair & Felt Co., Chicago, Ill.
●Armstrong Cork Co., Lancaster, Pa. (Cork)
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bigelow Liptak Corp., Detroit, Mich.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Asbestos, magnesia)
Cork Import Corp., Englewood, N. J. (Corkboard)
Cork Insulation Co., New York, N. Y. (cork)
●Durant Insulated Pipe Co., Palo Alto, Calif. (Underground)
Eagle-Picher Co., Cincinnati, O. (Mineral wool)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Forty-Eight Insulations, Inc., Aurora, Ill.
●Grant Wilson Inc., Chicago, Ill.
Gro-Quick Co., Chicago, Ill. (glass fiber and flexible tape)
International Vermiculite Co., Girard, Ill. (Vermiculite)
Johns-Manville, New York, N. Y. (Asbestos, magnesia, rock cork)
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Keasbey Co., Robert A., New York, N. Y. (Asbestos and cork)
●Keasbey & Mattison Co., Ambler, Pa. (Asbestos, magnesia)
Masonite Corp., Chicago, Ill.
Mortell Co., J. W., Kankakee, Ill. (plastic cork)
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn and Steele, Inc., South Boston, Mass.
●Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.
National Gypsum Co., Buffalo, N. Y. (Moulded)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos, magnesia)
●Owens-Corning Fiberglas Corp., Toledo, O.
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Poe Co., C. W., Cleveland, O.
●Porter & Co., Inc., H. W., Newark, N. J. (Underground)
Presstite Engineering Co., St. Louis, Mo.
Reflectal Corp., New York, N. Y. (laminated aluminum foil and asbestos paper)
●Ric-wiL Co., Cleveland, O.
Robinson Industries, Coleman, Mich. (expanded plastic)
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos, magnesia, calsilite)
Sall Mountain Co., Hamilton, O. (Asbestos and wool felt)
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell, wool felt and hair felt)
Sponge Rubber Products Co., Shelton, Conn. (cellular rubber)
Standard Asbestos Mfg. Co., Chicago, Ill.
●Union Asbestos & Rubber Co., Chicago, Ill.
United Cork Companies, Kearny, N. J.
Walker Jamar Co., Duluth, Minn.
Western Mineral Products Co., Minneapolis, Minn. (Underground)
Wilson & Co., Chicago, Ill. (hairfelt)
Wood Conversion Co., St. Paul, Minn.
Zonolite Co., Chicago, Ill. (underground)

IONIZATION APPARATUS

General Electric Co., Apparatus Dept., Schenectady, N. Y.
General Ozone Corp., Chicago, Ill.
Montgomery Bros., San Francisco, Calif.
United States Ozone Co. of America, Scottdale, Pa.
Welsbach Corp., The, Ozone Processes Div., Philadelphia, Pa.

IRON BODY VALVES

See Valves, Gate; and Valves, Globe

JACKETED PIPE

See Pipe, Jacketed

JACKETING FOR PIPE INSULATION

See Protectors, Pipe Covering

JETS, OVERFIRE AIR, FOR SMOKE ABATEMENT

Canton Stoker Corp., Canton, O.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Iron Fireman Mfg. Co., Cleveland, O.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Power Engineering Co., Chicago, Ill.

JOINTS, PIPE, ELECTRICAL INSULATING

American Hard Rubber Co., New York, N. Y.
Barco Mfg. Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.

JOINTS, PIPE, EXPANSION, PACKLESS

American District Steam Co., North Tonawanda, N. Y.
Badger Fire Extinguisher Co., Somerville, Mass.
●Badger Mfg. Co., Cambridge, Mass. (Corrugated copper, stainless steel)
Barco Mfg. Co., Chicago, Ill.
Chicago Metal Hose Corp., Maywood, Ill.
Cook Electric Co., Chicago, Ill.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
●Foster Wheeler Corp., New York, N. Y.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Harris & Co., Arthur, Chicago, Ill.
Kopperman & Sons, Joseph, Philadelphia, Pa.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Northern Indiana Brass Co., Elkhart, Ind.
●Ric-wiL Co., Cleveland, O.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Techniflex Corp., Port Jervis, N. Y.
United States Rubber Co., New York, N. Y.
●Zallea Brothers, Wilmington, Del.

JOINTS, PIPE, EXPANSION, SLIP

American District Steam Co., North Tonawanda, N. Y.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
●Illinois Engineering Co., Chicago, Ill.
Jarecki, Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Northern Indiana Brass Co., Elkhart, Ind.
Parks-Cramer Co., Fitchburg, Mass. (jacketed)
●Powell Co., Wm., Cincinnati, O.
Royalton Co., Gasport, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
United States Gasket Co., Camden, N. J.
●Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.
●Yarnall-Waring Co., Philadelphia, Pa.

JOINTS, PIPE, FLEXIBLE, SWING AND REVOLVING

Barco Mfg. Co., Chicago, Ill.
Bordo Co., Inc., L. J., Glenside, Pa.
Chiksan Co., Brea, Calif.
Crabb Engineering Co., Detroit, Mich.
Flexo Supply Co., Inc., St. Louis, Mo.
Gil-Lair Products, Inc., Pasadena, Calif.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Johnson Corp., The, Three Rivers, Mich.
Mayson Mfg. Co., Detroit, Mich.
Moran Flexible Joint Co., Inc., Louisville, Ky.
Patterson-Ballagh Corp., Los Angeles, Calif.
●Powell Co., Wm., Cincinnati, O.
●Spraying Systems Co., Bellwood, Ill.

JOINTS, UNIVERSAL, FOR OPERATING VALVES

Blood Brothers Machine Co., Allegan, Mich.
Brooks Equipment Corp., Hoboken, N. J.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Piezo Mfg. Corp., New York, N. Y.
Stow Mfg. Co., Binghamton, N. Y. (flexible shafts)

KATA THERMOMETERS

See Thermometers, Kata

LACQUERS

See Enamels and Lacquers

LAGGING ADHESIVES

See Adhesives, for Pipe Covering

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LAMPS, STERILIZING, FOR DUCT INSTALLATION

Coleman-Petterson Corp., Cleveland, O.
Fuller Co., D. William, Chicago, Ill.
General Electric Co., Lamp Dept., Cleveland, O.
Hanovia Chemical & Mfg. Co., Newark, N. J.
Lustra Corp. of America, Brooklyn, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.

LEAD PIPE

See Pipe and Tubing, Lead and Lead Alloy

LEAD SHEETS

See Sheets, Lead

LEAD TUBING

See Pipe and Tubing, Lead and Lead Alloy

LEAK DETECTORS

See Detectors, Leak, Refrigerant

LEATHER BELTING

See Belting, Flat, Leather

LEATHER PACKING

See Packing, Leather

LIGHTS, PILOT AND SIGNAL

Benjamin Electric Mfg. Co., Des Plaines, Ill.
Cooper Co., Clark, Palmyra, N. J.
Dial Light Co. of America, Inc., New York, N. Y.
General Electric Co., Lamp Dept., Cleveland, O.
Hart Mfg. Co., The, Hartford, Conn.
Pyle-National Co., The, Chicago, Ill.
Signal Indicator Co., New York, N. Y.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Westinghouse Electric Corp., Pittsburgh, Pa.

LINKS, FUSIBLE

General Electric Co., Apparatus Dept., Schenectady, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Morse-Smith-Morse, Inc., Watertown, Mass.
Preferred Utilities Mfg. Corp., New York, N. Y.

LIQUID LEVEL GAGES

See Gages, Liquid Level

LIQUID LEVEL INDICATORS

See Indicators, Liquid Level

LIQUID LEVEL RECORDERS

See Recorders, Liquid Level

LIQUID LEVEL REGULATORS

See Regulators, Liquid Level

LIQUID PRESSURE REGULATORS

See Regulators, Pressure, Liquid

LOCATORS, PIPE, UNDERGROUND

Fisher Research Laboratory, Inc., Palo Alto, Calif.
Globe Phone Mfg. Co., Reading, Mass.
Radioactive Products Inc., Detroit, Mich.
Wilkinson Products Co., Pasadena, Calif.

LOCK FORMING MACHINES

See Machines, Pittsburgh Lock Forming

LOCK NUTS

See Nuts, Lock

LOUVERS AND SHUTTERS, AUTOMATICALLY OR MANUALLY CONTROLLED

●Air Conditioning Products Co., Detroit, Mich.
Air Control Products, Inc., Coopersville, Mich.
●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
Airmaster Corp., Chicago, Ill.
Allen Ventilator Div., Production Planning Co., Rochester, Mich.
American Coolair Corp., Jacksonville, Fla.
American Foundry & Furnace Co., Bloomington, Ill.
American Steel Band Co., Pittsburgh, Pa.
American Warming & Ventilating Co., Toledo, O.
Ammerman Co., C. L., Minneapolis, Minn.
Arex Co., Chicago, Ill.
Barber-Colman Co., Rockford, Ill.
Barnes Co., A. D., Dayton, O.
Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.
Biersach & Niedermeyer Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Commercialaire, Inc., Brooklyn, N. Y.
Conoflow Corp., Philadelphia, Pa.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Decatur Iron & Steel Co., Decatur, Ala.
Dual-Air Fan Co., South Elgin, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Elgo Shutter & Mfg. Co., Detroit, Mich.
Empire Ventilation Equipment Co., Long Island City, N. Y. (stationary)
●General Blower Co., Morton Grove, Ill.
●Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
Jamieson Mfg. Co., Dallas, Tex.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
Kane Mfg. Corp., Kane, Pa.
King Co., The, Owatonna, Minn.
Krauser-Boyd, Inc., North Tonawanda, N. Y.
Lau Blower Co., Dayton, O.
Lockjoint Wood Products Co., Wichita, Kans. (Wood; stationary door, wall, window and ceiling)
Martin Fan & Blower Co., Chicago, Ill.
Maysteel Products, Inc., Milwaukee, Wis.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Meyer Mfg. Co., Detroit, Mich.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Myers Electric Co., Inc., Pittsburgh, Pa.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
Peerless Electric Co., Warren, O.
Reed Unit-Fans, Inc., New Orleans, La.
●Register & Grille Mfg. Co., Brooklyn, N. Y.
Riggin Metal Products, Inc., Kankakee, Ill.
Robertson Co., H. H., Pittsburgh, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Signal Electric Mfg. Co., Menominee, Mich.
Sioux Steel Co., Sioux Falls, S. D.
Southbridge Roofing Co., Inc., Southbridge, Mass.
●Standard Stamping & Perforating Co., Chicago, Ill.
●Swartwout Co., Cleveland, O.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Gypsum Co., Chicago, Ill.
United States Register Co., Battle Creek, Mich.
Uno Ventilator Co., Malden, Mass.
●Utility Appliance Corp., Beverly Hills, Calif.
Van Noorden Co., E., Boston, Mass.
White & Sons, Inc., Wilfrid O., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.

LOW WATER CUT-OFFS

See Cut-offs, Low Water, Heating Boiler

MACHINES, BALANCING

See Equipment, Balancing

MACHINES, BLUE PRINT AND WHITE PRINT

For Reproducing Engineering Drawings

American Photocopy Equipment Co., Chicago, Ill.
Bruning Co., Inc., Charles, Chicago, Ill.
Dietzgen Co., Eugene, Chicago, Ill.
Ozalid Div. of General Aniline & Film Corp., Johnson City, N. Y.
Paragon-Revolute Corp., Rochester, N. Y.
Pease Co., C. F., The, Chicago, Ill.
Peck & Harvey, Chicago, Ill.

MACHINES AND FILM, X-RAY

du Pont de Nemours & Co., E. I., Photo Products Dept., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Kelley Koett Mfg. Co., The, Covington, Ky.
North American Philips Co., Inc., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.

MACHINES, PIPE CLEANING

American Wheelabrator & Equipment Corp., Mishawaka, Ind. (for preparation of surface prior to coating)
Continental Machine Co., Chicago, Ill.
Spartan Tool Co., Chicago, Ill.
Wilson, Inc., Thomas C., Long Island City, N. Y.

MACHINES, PIPE CUTTING AND THREADING, PORTABLE

American Die & Tool Co., Inc., Reading, Pa.
Beaver Pipe Tools, Inc., Warren, O.

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Capewell Mfg. Co., Hartford, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Muncie Gear Wks., Inc., Muncie, Ind.
Obear & Son, W. F., Los Angeles, Calif.
Oster Mfg. Co., Cleveland, O.
Quijada Tool Co., Inc., Los Angeles, Calif.
●Ridge Tool Co., Elyria, O. (Hand)
Thread-Ezy Mfg. Co., Corunna, Mich.
Toledo Pipe Threading Machine Co., Toledo, O.

MACHINES, PIPE CUTTING AND THREADING, STATIONARY

Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
Capewell Mfg. Co., Hartford, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Obear & Son, W. F., Los Angeles, Calif.
Oster Mfg. Co., Cleveland, O.
Quijada Tool Co., Inc., Los Angeles, Calif.
Saunders Machine & Tool Corp., Yonkers, N. Y.
Stratford Pipe Scalloper Machine Co., Stratford, Conn.
Toledo Pipe Threading Machine Co., Toledo, O.

MACHINES, PITTSBURGH LOCK FORMING

Lockformer Co., Chicago, Ill.
Maplewood Machinery Co., Inc., Chicago, Ill.
Whitney Metal Tool Co., Rockford, Ill.

MACHINES, REFRIGERATION, ABSORPTION

●Carrier Corp., Syracuse, N. Y.
Servel, Inc., Electric Refrigeration Div., Evansville, Ind.
Vogt Machine Co., Henry, Louisville, Ky.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeraton Div., Harrison, N. J.
York Corp., York, Pa.

MACHINES, SLIP ROLL FORMING

Altens Foundry & Machine Works, Inc., Lancaster, O.
Barth Mfg. Co., Milldale, Conn.
Hendley & Whittmore Co., Beloit, Wis.
Kling Bros. Engineering Wks., Chicago, Ill.
Milton Equipment Co., Philadelphia, Pa.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
San Angelo Foundry & Machine Co., San Angelo, Tex.
Webb Corp., The, Webb City, Mo.
Wysong & Miles, Greensboro, N. C.

MACHINES, TESTING, WELD

Air Reduction Sales Co., New York, N. Y.
Dillon Co., Inc., W. C., Forest Park, Ill.
Olsen Testing Machine Co., Tinius, Willow Grove, Pa.

MAGNESIUM ALLOY SHEETS

See Sheets, Magnesium Alloy

MAGNESIUM TUBING

See Tubing, Magnesium

MALLEABLE UNIONS

See Unions, Malleable

MANIFOLDS AND HEADERS, PREFABRICATED, FOR HEATING SYSTEMS

●Grinnell Co., Inc., Providence, R. I.
H & G Plumbing Products, Inc., Port Washington, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.

MANIFOLDS, REFRIGERATION

Ball Welding Works, Inc., Oakland, Calif.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Mueller Brass Co., Port Huron, Mich.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Superior Valve and Fittings Co., Pittsburgh, Pa.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Vilter Mfg. Co., Milwaukee, Wis.
York Corp., York, Pa.

MANOMETERS

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence Inc., Div. of Builders Iron Foundry, Providence, R. I.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
●Hastings Instrument Co., Inc., Hampton, Va.
●Hays Corp., Michigan City, Ind.
Hill, E. Vernon & Co., Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
King Engineering Corp., Ann Arbor, Mich.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Norwalk Valve Co., South Norwalk, Conn.
Precision Scientific Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
●Refinite Corp., Omaha, Neb.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Wallace & Tiernan Co., Inc., Newark, N. J.
Will Corp., Rochester, N. Y.

MECHANICAL DRIVE TURBINES

See Turbines, Mechanical Drive

MECHANICAL SPEED CHANGERS

See Changers, Speed, Mechanical

MECHANICAL TRAPS

See Traps, Steam, Mechanical

MERCURY SWITCHES

See Switches, Mercury

METAL HOSE

See Hose, Metal and Fittings

METAL, POROUS, FOR FILTRATION, SEPARATION, DIFFUSION AND FLOW CONTROL

Keystone Carbon Co., Inc., St. Marys, Pa.
Moraine Products Div., General Motors Corp., Dayton, O.
Wabash Mfg. Co., Chicago, Ill.

METALLIC BELLOWS

See Bellows, Thermostatic and Metallic

METALLIC PACKING

See Packing, Metallic

METERS, AIR VELOCITY, DIRECT READING

●Anemostat Corp. of America, New York, N. Y.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
●Hastings Instrument Co., Inc., Hampton, Va.
●Hays Corp., Michigan City, Ind.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Taylor Instrument Companies, Rochester, N. Y.

METERS, BTU, FOR MEASURING FLOW AND TEMPERATURE AND CALIBRATED IN BTU OR THERMS

Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.

METERS, CONDENSATION

American District Steam Co., North Tonawanda, N. Y.
Buffalo Meter Co., Buffalo, N. Y.
Central Station Steam Co., Detroit, Mich.
Neptune Meter Co., New York, N. Y.

METERS, FLOW, REFRIGERANT

Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
●Hays Corp., Michigan City, Ind.
Moore Products Co., Philadelphia, Pa.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.

Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Trimount Instrument Co., Chicago, Ill.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.

METERS, FLOW, STEAM

American District Steam Co., North Tonawanda, N. Y.
American Meter Co., Inc., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instrument Div., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.

METERS, PROCESS LIQUID

American Meter Co., Inc., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bowser, Inc., Fort Wayne, Ind.
Bristol Co., The, Waterbury, Conn.
Buffalo Meter Co., Buffalo, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia.
Moore Products Co., Philadelphia, Pa.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Rockwell Mfg. Co., Meter and Valve Div., Pittsburgh, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Worthington-Gamon Meter Co., Newark, N. J.

METERS, VOLUME, AIR AND GAS

American Meter Co., Inc., New York, N. Y.
Bristol Co., The, Waterbury, Conn.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
●Hastings Instrument Co., Inc., Hampton, Va.
●Hays Corp., Michigan City, Ind.
Meriam Instrument Co., The, Cleveland, O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Rockwell Mfg. Co., Meter & Valve Div., Pittsburgh, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Selas Corp. of America, Philadelphia, Pa.
Taylor Instrument Companies, Rochester, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.

METERS, WATER

American Moistening Co., Providence, R. I.
Bailey Meter Co., Cleveland, O.
Buffalo Meter Co., Buffalo, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
Hersey Mfg. Co., South Boston, Mass.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
National Meter Co., Brooklyn, N. Y.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pfening Co., Fred D., Columbus, O. (batch measuring)
Republic Flow Meters Co., Chicago, Ill.
Rockwell Mfg. Co., Meter and Valve Div., Pittsburgh, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Union Water Meter Co., Worcester, Mass.
Worthington-Gamon Meter Co., Newark, N. J.

MIXING VALVES

See Valves, Mixing, Steam and Water

MODULATING VALVES

See Valves, Radiator, Steam and Hot Water Modulating

MOTOR BASES

See Bases and Pads, Vibration Isolating; Bases, Motor Tension Adjusting

MOTOR CONTROLLERS

See Controllers and Starters, Motor

MOTOR OPERATED VALVES

See Valves, Motor Operated

MOTOR STARTERS

See Controllers and Starters, Motor

MOTORS, ELECTRIC, FRACTIONAL HP

Abart Gear & Machine Co., Chicago, Ill.
Alliance Mfg. Co., Alliance, O. (Shaded pole)
●Baldor Electric Co., St. Louis, Mo.
Barber-Colman Co., Rockford, Ill.
Bodine Electric Co., Chicago, Ill.
Brown-Brockmeyer Co., Inc., Dayton, O.
Burke Electric Co., Div. of Marathon Electric Mfg. Corp., Erie, Pa.
Canatsey Electric Mfg. Co., Kansas City, Mo.
●Century Electric Co., St. Louis, Mo.
Crise Mfg. Co., The, Columbus, O.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Delco Products Div., General Motors Corp., Dayton, O.
Diehl Mfg. Co., Somerville, N. J.
Eastern Air Devices, Inc., Brooklyn, N. Y.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Electric Motor Corp., Div. of Howard Industries, Inc., Racine, Wis.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fasco Industries, Inc., Rochester, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Franklin Electric Co., Inc., Bluffton, Ind.
General Die and Stamping Co., New York, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hansen Mfg. Co., Inc., Princeton, Ind.
Hoover Co., Kingston-Conley Div., North Plainfield, N. J.
Howell Electric Motors Co., Howell, Mich.
Jack & Heintz Precision Industries, Inc., Cleveland, O.
Kraus Co., Walter S., Woodside, L. I., N. Y.
Lamb Electric Co., Kent, O.
Leland Electric Co., The, Dayton, O.
Lima Electric Motor Co., The, Lima, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Master Electric Co., Dayton, O.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Moore Co., The, Marceline, Mo. (Slow speed fan motors)
Ohio Electric Mfg. Co., Cleveland, O.
Peerless Electric Co., Warren, O.
Portable Electric Tools, Inc., Chicago, Ill.
Redmond Co., Inc., Owosso, Mich.
Reynolds Electric Co., River Grove, Ill.
Ripley Co., Inc., Middletown, Conn.
Robbins & Myers, Inc., Springfield, O.
Rotor Corp., Miamisburg, O.
Royal Mfg. Corp., Waterloo, Ind.
Reuland Electric Co., Alhambra, Calif.
Signal Electric Mfg. Co., Menominee, Mich.
Small Motors Inc., Chicago, Ill.
Smith Corp., A. O., Milwaukee, Wis.
Speedway Mfg. Co., Chicago (Cicero), Ill.
Sutton Corp., O. A., Wichita, Kan.
Torq Electric Mfg. Corp., Bedford, O.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Victor Electric Products, Inc., Cincinnati, O.
●Wagner Electric Corp., St. Louis, Mo.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whirlaway Motors, Inc., Tipp City, O.

MOTORS, ELECTRIC, 1 HP AND OVER

Abart Gear & Machine Co., Chicago, Ill.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Allis Co., Louis, The, Milwaukee, Wis.
●Baldor Electric Co., St. Louis, Mo.
Bogue Electric Co., Paterson, N. J.
Brown-Brockmeyer Co., Inc., Dayton, O.
Burke Electric Co., Div. of Marathon Electric Mfg. Corp., Erie, Pa.
●Century Electric Co., St. Louis, Mo.
Continental Electric Co., Inc., Newark, N. J.
●Crocker-Wheeler Div., Elliott Co., Ampere, N. J.
Delco Products Div., General Motors Corp., Dayton, O.
Diehl Mfg. Co., Somerville, N. J.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro Dynamic, Div. of the Electric Boat Co., Bayonne, N. J.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fairbanks, Morse & Co., Chicago, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hertner Electric Co., The, Cleveland, O.
Hoover Co., Kingston-Conley Div., North Plainfield, N. J.
Howell Electric Motors Co., Howell, Mich.
Ideal Electric & Mfg. Co., Mansfield, O.
Imperial Electric Co., Akron, O.

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●Jackson Co., Byron, Los Angeles, Calif. (Submersible)
Kraus Co., Walter S., Woodside, L. I., N. Y.
Leland Electric Co., The, Dayton, O.
Lima Electric Motor Co., The, Lima, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Marble-Card Electric Co., Gladstone, Mich.
Master Electric Co., Dayton, O.
●Moore Co., The, Marceline, Mo. (Slow speed fan motors)
Peerless Electric Co., Warren, O.
Reliance Electric & Engineering Co., Cleveland, O.
Reuland Electric Co., Alhambra, Calif.
Robbins & Myers, Inc., Springfield, O.
Smith Corp., A. O., Milwaukee, Wis.
Star-Kimble Motor Div., Miehle Prntg. Press & Mfg. Co., Bloomfield, N. J.
Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
●Wagner Electric Corp., St. Louis, Mo.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whirlaway Motors, Inc., Tipp City, O.

MOUNTINGS, VIBRATION

See Bases and Pads, Vibration Isolating

MUFFLERS, HOT GAS, FOR REFRIGERANT LINES

Armstrong Co., Richard M., West Chester, Pa.
●Industrial Acoustics Co., New York, N. Y.

MUSHROOM VENTILATORS

See Ventilators, Mushroom

NEUTRALIZERS, ACID

See Dehydrant and Acid Neutralizer

NEUTRALIZERS, ODOR

See Adsorbers, Odor

NICKEL AND NICKEL ALLOY PIPE AND FITTINGS

See Tubing, Nickel and Alloy; Fittings, Pipe, Nickel and Nickel Alloy; Pipe, Nickel and Nickel Alloy

NICKEL AND NICKEL ALLOY SHEETS

See Sheets, Nickel and Nickel Alloy

NIPPLES, PIPE, BRASS AND COPPER

Acheson Mfg. Co., Rankin, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Nipple Mfg. Co., Cicero, Ill.
Columbus Mfg. & Supply Co., Columbus, O.
Couplings Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
G & H Mfg. Co., Philadelphia, Pa.
Gilbert Brass Foundry Co., St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
Keeney Mfg. Co., Newington, Conn.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Star Tubular Products Co., Chicago, Ill.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Ware Coupling & Nipple Co., Ware, Mass.
Weatherhead Co., Cleveland, O.

NIPPLES, PIPE, FLEXIBLE

●Davis Engineering Corp., Elizabeth, N. J.
Lindy Heaters, Inc., New York, N. Y.
Techniflex Corp., Port Jervis, N. Y.

NIPPLES, PIPE, IRON AND STEEL

Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Chicago Nipple Mfg. Co., Cicero, Ill.
Clow & Sons, James B., Chicago, Ill.
Columbus Mfg. & Supply Co., Columbus, O.
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa. (Swage)
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
Illinois Malleable Iron Co., Chicago, Ill.
Larkin Packer Co., St. Louis, Mo.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Star Tubular Products Co., Chicago, Ill.
Union Malleable Mfg. Co., Ashland, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Ware Coupling & Nipple Co., Ware, Mass.
Wheeling Machine Products Co., Wheeling, W. Va.

NIPPLES, PIPE, NICKEL AND NICKEL ALLOY

Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
International Nickel Co., Inc., The, New York, N. Y.

NIPPLES, RADIATOR, SLIP AND SCREW

Plumb Mfg. Co., Utica, N. Y.

NOISE ELIMINATION FOR COOLING TOWERS

●Industrial Acoustics Co., New York, N. Y.
●Industrial Sound Control, Inc., Hartford, Conn.

NOISE ELIMINATORS

See Bases and Pads, Vibration Isolating; Hose, Metal and Fittings; Insulation, Sound Deadening

NOZZLES, ATOMIZING

American Moistening Co., Providence, R. I.
Bahnson Co., Winston-Salem, N. C.
Benjamin Air Rifle Co., St. Louis, Mo.
Bete Fog Nozzle Inc., Greenfield, Mass.
●Binks Mfg. Co., Chicago, Ill.
●Delavan Mfg. Co., Des Moines, Ia.
Electric Sprayit Co., The, Sheboygan, Wis.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marley Co., Inc., The, Kansas City, Kans.
Martocello & Co., Jos. A., Philadelphia, Pa.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Parks-Cramer Co., Fitchburg, Mass.
Ross Sprinkler Co., Pasadena, Calif.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Supreme Electric Products Corp., Rochester, N. Y.
Water Cooling Corp., New York, N. Y.

NOZZLES, FLOODING

●Marley Co., Inc., The, Kansas City, Kans.
●Spraying Systems Co., Bellwood, Ill.
Water Cooling Corp., New York, N. Y.

NOZZLES, SPARGER, FOR TANK HEATING

Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.

NOZZLES, SPRAY

American Cooling Tower Co., Kansas City, Mo.
American Moistening Co., Providence, R. I.
●April Showers Co., Inc., Washington, D. C.
Bahnson Co., Winston-Salem, N. C.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
●Bayley Blower Co., Milwaukee, Wis.
Benjamin Air Rifle Co., St. Louis, Mo.
●Bete Fog Nozzle Inc., Greenfield, Mass.
●Binks Mfg. Co., Chicago, Ill.
Black Mfg. Co., The, Parkton, Md.
Blower Application Co., Milwaukee, Wis.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Chain Belt Co., Milwaukee, Wis.
●Clarage Fan Co., Kalamazoo, Mich.
●Delavan Mfg. Co., Des Moines, Ia.
Dustlix Corp., Milwaukee, Wis.
Eclipse Air Brush Co., Inc., Newark, N. J.
Electric Sprayit Co., The, Sheboygan, Wis.
Fluor Corp., Ltd., The, Los Angeles, Calif.
●Grinnell Co., Inc., Providence, R. I.
Harry Cooling Towers, Inc., New York, N. Y.
Leinweber Aluminum Nozzles, Chicago, Ill.
Link-Belt Co., Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marley Co., Inc., The, Kansas City, Mo.
Martocello & Co., Jos. A., Philadelphia, Pa.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
Parks-Cramer Co., Fitchburg, Mass.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
Plummer Spray Equipment Co., Napoleon, O.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Rega Mfg. Co., Rochester, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Ross Sprinkler Co., Pasadena, Calif.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Skinner Irrigation Co., Troy, O.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Supreme Electric Products Corp., Rochester, N. Y.
Thermal Industries, San Francisco, Calif.

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Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
●Yarnall-Waring Co., Philadelphia, Pa.

NUTS, LOCK

Chase Brass & Copper Co., Waterbury, Conn.
●Crane Co., Chicago, Ill.
Elastic Stop Nut Corp. of America, Union, N. J.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
●Grinnell Co., Inc., Providence, R. I.
Grip Nut Co., Chicago, Ill.
Industrial Screw Co., Chicago, Ill.
Kwikon Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
Locknut Corp. of America, Chicago, Ill.
MacLean-Fogg Lock Nut Co., Chicago, Ill.
Palnut Co., Irvington, N. J.
Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
SKF Industries, Inc., Philadelphia, Pa.
Shakeproof, Inc., Chicago, Ill. (Lock washers)
Standard Pressed Steel Co., Jenkintown, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Swallow Airplane Co., Wichita, Kan.
Tinnerman Products, Inc., Cleveland, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

OBSERVATION BOILER PORTS

See Ports, Observation, Boiler

ODOR ADSORBERS

See Filters, Air; Adsorbers, Odor

ODOR NEUTRALIZERS

See Adsorbers, Odor; Compounds, Air Freshening

OIL BURNERS

See Burners, Oil

OIL COOLERS

See Coolers, Oil

OIL, REFRIGERATION

Ansul Chemical Co., Refrigeration Div., Marinette, Wis.
●Frick Co., Waynesboro, Pa.
Gulf Oil Corp., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Illinois Oil Products, Inc., Rock Island, Ill.
Shell Oil Co., Lubricants Dept., New York, N. Y.
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Standard Oil Co. of California, Los Angeles, Calif.
Standard Oil Co. of Indiana, Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.

OIL SEPARATORS

See Separators, Steam and Oil

OPERATORS, DAMPER, DUCT

A-P Controls Corp., Milwaukee, Wis.
Arens Controls, Inc., Evanston, Ill.
Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Western Springs, Ill.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
General Controls Co., Glendale, Calif.
Hagan Corp., Pittsburgh, Pa.
Hart & Cooley Mfg. Co., Holland, Mich.
●Johnson Service Co., Milwaukee, Wis.
Mason-Neilan Regulator Co., Boston, Mass.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Skokie, Ill.
Sampsel Time Control, Inc., Spring Valley, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments, Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Young Regulator Co., Cleveland, O.

OPERATORS, VALVE

Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Babbitt Steam Specialty Co., New Bedford, Mass.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Foxboro Co., Foxboro, Mass.
●General Controls Co., Glendale, Calif.
Grove Regulator Co., Oakland, Calif.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
●Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., North Bergen, N. J.
Ledeen Mfg. Co., Los Angeles, Calif.
Mason-Neilan Regulator Co., Boston, Mass.
●McDonnell & Miller, Inc., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.

ORIFICE FLANGES

See Flanges, Orifice

ORIFICE UNIONS

See Unions, Orifice

ORIFICES, RADIATOR

Autempco Corp., New York, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Grinnell Co., Inc., Providence, R. I.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
New York Air Valve Corp., Brooklyn, N. Y.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Tallmadge, Webster, Systems, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Thrush & Co., H. A., Peru, Ind.
●Webster & Co., Warren, Camden, N. J.

OVERFIRE AIR JETS

See Jets, Overfire Air, for Smoke Abatement

OVER-PRESSURE UNLOADERS, FOR REFRIGERANTS

Black-Sivalls & Bryson, Inc., Kansas City, Mo.
●Henry Valve Co., Melrose Park, Ill.

OXYGEN PIPING AND REGULATING SYSTEMS

Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Oxygen Equipment & Service Co., Chicago, Ill.

OZONE APPARATUS

General Ozone Corp., Chicago, Ill.
Montgomery Bros., San Francisco, Calif.
Norwood Associated Engineers Inc., Springfield, Mass.
Ozone Air Co., Grand Rapids, Mich.
United States Ozone Co. of America, Scottdale, Pa.
Welsbach Corp., The, Ozone Processes Div., Philadelphia, Pa.

PACKAGED HEAT PUMP UNITS

See Unit, Air Conditioning, Reverse Refrigeration Cycle

PACKAGED STEAM GENERATORS

See Boilers, Steam Generating Units, Heating and Process

PACKING, ASBESTOS

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Allpax Co., Inc., Mamaroneck, N. Y.
Anchor Packing Co., Philadelphia, Pa.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chesterton Co., A. W., Everett, Mass.
Chicago Gasket Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Durabla Mfg. Co., New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felt Products Mfg. Co., Chicago, Ill.
Flexrock Co., Philadelphia, Pa.

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Garlock Packing Co., Palmyra, N. Y.
Gatke Corp., Chicago, Ill.
Goodyear Tire & Rubber Co., Akron, O.
●Grant Wilson Inc., Chicago, Ill.
Greene, Tweed & Co., North Wales, Pa.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
Klingerit, Inc., New York, N. Y. (Sheet and rod)
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Sall Mountain Co., Hamilton, O.
●Union Asbestos & Rubber Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PACKING, FIBER

American Felt Co., Glenville, Conn.
Anchor Packing Co., Philadelphia, Pa.
●Armstrong Cork Co., Lancaster, Pa.
Belmont Packing & Rubber Co., The, Philadelphia, Pa
Chesterton Co., A. W., Everett, Mass.
Chicago Gasket Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Durabla Mfg. Co., New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Endura Mfg. Corp., Quakertown, Pa.
Flexrock Co., Philadelphia, Pa.
Garlock Packing Co., Palmyra, N. Y.
Greene, Tweed & Co., North Wales, Pa.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
●Union Asbestos & Rubber Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PACKING, LEATHER

Alexander Bros., Philadelphia, Pa.
Anchor Packing Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Belmont Packing & Rubber Co., The, Philadelphia, Pa
Chicago Belting Co., Chicago, Ill.
Chicago Gasket Co., Chicago, Ill.
Davis & Co., Wayne, Westboro, Mass.
Excelsior Leather Washer Mfg. Co., Rockford, Ill.
Garlock Packing Co., Palmyra, N. Y.
Graton & Knight Co., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Q-P Mfg. Co., Needham Heights, Mass.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schieren Co., Chas. A., New York, N. Y.
Williams & Son, I. B., Dover, N. H.
Zimmerman Packing Co., Cincinnati, O.

PACKING, METALLIC

Allpax Co., Inc., Mamaroneck, N. Y.
Anchor Packing Co., Philadelphia, Pa.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Chesterton Co., A. W., Everett, Mass.
Chicago Gasket Co., Chicago, Ill.
Conneaut Plastic Metallic Packing Co., Conneaut, O.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Felt Products Mfg. Co., Chicago, Ill.
Flexrock Co., Philadelphia, Pa.
France Packing Co., Philadelphia, Pa.
Garlock Packing Co., Palmyra, N. Y.
Greene, Tweed & Co., North Wales, Pa.
Johns-Manville, New York, N. Y.
Klingerit, Inc., New York, N. Y. (Sheet & rod)
Linear Incorporated, Philadelphia, Pa.
National Engineering Products Inc., Washington, D. C.
National Lead Co., New York, N. Y.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, Pa.
●Union Asbestos & Rubber Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PACKING, RUBBER AND SYNTHETIC

American Felt Co., Glenville, Conn.
Anchor Packing Co., Philadelphia, Pa.
●Armstrong Cork Co., Lancaster, Pa.
Arrowhead Rubber Co., Downey, Calif.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Chesterton Co., A. W., Everett, Mass.
Chicago Belting Co., Chicago, Ill.
Chicago Gasket Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Continental Rubber Wks., Erie, Pa.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Dow Corning Corp., Midland, Mich.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felt Products Mfg. Co., Chicago, Ill.
Firestone Industrial Products Co., Akron, O.
Flexrock Co., Philadelphia, Pa.
Garlock Packing Co., Palmyra, N. Y.
Gates Rubber Co., Denver, Colo.
General Electric Co., Chemical Dept., Pittsfield, Mass.
Gil-Lair Products, Inc., Pasadena, Calif.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Graton & Knight Co., Worcester, Mass.
Greene, Tweed & Co., North Wales, Pa.
Hamilton Rubber Mfg. Corp., Trenton, N. J.
Houghton & Co., E. F., Philadelphia, Pa.
Johns-Manville, New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Resistoflex Corp., Belleville, N. J.
Saran Lined Pipe Co., Ferndale, Mich.
Thermoid Co., Trenton, N. J.
United States Gasket Co., Camden, N. J.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PANEL BOARDS

See Boards, Panel and Control

PANEL HEATING AND COOLING

See Coils and Panels, Radiant Heating and Cooling; Conductors and Panels, Electrical, for Radiant Heating

PANELS, PERFORATED, FOR AIR DIFFUSION

●Multi-Vent Div., Pyle-National Co., The, Chicago, Ill.
Simplex Ceiling Corp., New York, N. Y.

PARTS FOR HEATING AND AIR CONDITIONING EQUIPMENT

Ackermann Mfg. Co., Wheeling, W. Va.
Air & Refrigeration Corp., New York, N. Y. (insulated panels)
●Atlas Mfg. Co., St. Paul, Minn. (cabinets for unit air conditioners & Boilers)
Berger Mfg. Div., Republic Steel Corp., Canton, O. (cabinets, housings, canopies)
Camloc Fastener Corp., New York, N. Y. (Fasteners for access panels and sheet metal)
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Insulating panel for housing and duct construction)
Cincinnati Metalcrafts Inc., Cincinnati, O. (sheet metal fabricating)
Commercial Shearing & Stamping Co., Youngstown, O.
Detroit Stamping Co., Detroit, Mich.
Dover Metal Products Co., The, Canal Fulton, O.
Dzus Fastener Co., Inc., Babylon, N. Y. (quick-acting quarter-turn fasteners for access doors, inspection panels, etc.)
Falstrom Co., Passaic, N. J. (Air conditioning cabinets, steel control panels)
Lindsay Structure, Inc., Skokie, Ill. (Cabinet construction for air conditioning and warm air heating equipment)
Metalcraft Inc., Mason City, Ia. (nameplates for equipment)
●Mueller Brass Co., Port Huron, Mich. (Specially fabricated copper tubing, machine formed tubes)
South Chester Co., Southco Div., Lester, Pa. (blind rivets, panel fasteners, adjustable pawl fasteners, door retaining springs)
Rigidized Metals Corp., Buffalo, N. Y.

PENETRANT, DYE, FOR NON-DESTRUCTIVE TESTING OF METAL

Dy-Check Co., Div. of Northrop Aircraft, Inc., Hawthorne, Calif.

pH INDICATORS

See Indicators, pH

PILLOW BLOCK BEARINGS

See Bearings, Pillow Block

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PILOT LIGHTS
See Lights, Pilot and Signal

PIPE, ALUMINUM
Aluminum Co. of America, Pittsburgh, Pa.
Colonial Alloy Co., Metals Div., Philadelphia, Pa.
●Revere Copper & Brass, Inc., New York, N. Y.
Reynolds Metals Co., Louisville, Ky.
Viking Copper Tube Co., Cleveland, O.

PIPE, ASBESTOS FIBER AND CEMENT
Johns-Manville, New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.

PIPE BENDERS
See Benders, Pipe

PIPE, BRASS AND COPPER
American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hussey & Co., C. G., Pittsburgh, Pa.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Phelps Dodge Copper Products Corp., British American Tube Div., New York, N. Y.
Reading Tube Corp., Long Island City, N. Y.
●Revere Copper and Brass, Incorporated, New York, N. Y.
Viking Copper Tube Co., Cleveland, O.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.

PIPE, CAST IRON, PRESSURE, BELL AND SPIGOT
Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Central Foundry Co., Newark, N. J.
Clow & Sons, James B., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Lynchburg Foundry Co., Lynchburg, Va.
McWane Cast Iron Pipe Co., Birmingham, Ala.
Somerville Iron Works, Somerville, N. J.
United States Pipe & Foundry Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE, CAST IRON, PRESSURE, FLANGED
Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Clow & Sons, James B., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Lynchburg Foundry Co., Lynchburg, Va.
McWane Cast Iron Pipe Co., Birmingham, Ala.
United States Pipe & Foundry Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE, CAST IRON, THREADED
American Cast Iron Pipe Co., Birmingham, Ala.
Clow & Sons, James B., Chicago, Ill.
McWane Cast Iron Pipe Co., Birmingham, Ala.
Somerville Iron Wks., Somerville, N. J.
United States Pipe & Foundry Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE CLEANING COMPOUNDS
See Compounds, Cleaning, Pipe Coil and Condenser

PIPE COILS
See Coils, Pipe

PIPE COUPLINGS
See Couplings, Pipe

PIPE COVERING, ADHESIVES
See Adhesives, for Pipe Covering

PIPE CUTTERS
See Cutters

PIPE CUTTING MACHINES
See Machines, Pipe Cutting and Threading

PIPE EXTRACTORS
See Extractors, Pipe

PIPE, FIBER
Brown Co., Boston, Mass.
Orangeburg Mfg. Co., Orangeburg, N. Y.
United States Plywood Corp., New York, N. Y.

PIPE AND FITTINGS, GAS VENT AND FLUE
Condensation Engineering Corp., Chicago, Ill.
Enderle, Inc., Ltd., Frank X., Los Angeles, Calif.
Excelsior Steel Furnace Co., The, Chicago, Ill.
Heremetal Co., Minneapolis, Minn.
Johns-Manville, New York, N. Y.
Standard Furnace Supply Co., Omaha, Neb.
Van-Packer Corp., Chicago, Ill.
●Wallace Co., William, Metalbestos Div., Belmont, Calif.

PIPE FITTINGS
See Fittings, Pipe

PIPE, GLASS
Corning Glass Wks., Corning, N. Y.
Fischer & Porter Co., Hatboro, Pa.

PIPE HANGERS
See Hangers and Supports, Pipe

PIPE, HARD RUBBER
American Hard Rubber Co., New York, N. Y.
Goodrich Co., B. F., Akron, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Raybestos-Manhattan, Inc., Passaic, N. J.
Stokes Molded Products, Inc., Trenton, N. J.
United States Rubber Co., New York, N. Y.

PIPE INSULATION ADHESIVES
See Adhesives, for Pipe Covering

PIPE, JACKETED
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Fluid Systems, Inc., New Haven, Conn.
Kaiser Co., E. B., Chicago, Ill.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Nooter Corp., St. Louis, Mo.
Parks-Cramer Co., Fitchburg, Mass.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
●Ric-wiL Co., Cleveland, O.
Roessing Mfg. Co., Pittsburgh, Pa.
Shaw-Kendall Engineering Co., Toledo, O.

PIPE JOINT COMPOUNDS
See Cement and Compounds, Pipe Joint

PIPE LOCATORS
See Locators, Pipe, Underground

PIPE, LINED
American Brass Co., Waterbury, Conn. (Tin)
American Cast Iron Pipe Co., Birmingham, Ala. (Cement)
American Hard Rubber Co., New York, N. Y. (Rubber)
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Bart Mfg. Corp., Belleville, N. J.
Cement Lined Pipe Co., Lynn, Mass. (Cement)
Clow & Sons, James B., Chicago, Ill.
Division Lead Co., Chicago, Ill.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O. (Rubber-lined)
Heresite & Chemical Co., Manitowoc, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa. (Cement)
Kaiser Co., E. B., Chicago, Ill.
Knight, Maurice A., Akron, O.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin lined)
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Michigan Pipe Co., Bay City, Mich. (Wood, saran rubber)
National Lead Co., New York, N. Y. (Lead)
Nooter Corp., St. Louis, Mo.
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (Lead)
Saran Lined Pipe Co., Ferndale, Mich.
United States Rubber Co., New York, N. Y. (Rubber)
United States Stoneware Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y. (Cement)
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, NICKEL AND NICKEL ALLOY
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.

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Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
International Nickel Co., Inc., The, New York, N. Y.
●Revere Copper and Brass, Incorporated, New York, N. Y.
Tri-Clover Machine Co., Kenosha, Wis.

PIPE, PLASTIC

Acadia Synthetic Products, Div., Western Felt Works, Chicago, Ill.
American Agile Corp., Cleveland, O.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Extruded Plastics, Inc., Norwalk, Conn.
General Ceramics & Steatite Corp., Keasbey, N. J.
Haveg Corp., Newark, Del.
Knight, Maurice A., Akron, O.
Mills Corp., Elmer E., Chicago, Ill.
North Penn Co., New York, N. Y.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
Saran Lined Pipe Co., Ferndale, Mich.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

PIPE, PRE-INSULATED

●Durant Insulated Pipe Co., Palo Alto, Calif.
Flexible Tubing Corp., Guilford, Conn.
Kaiser Co., E. B., Chicago, Ill.
●Ric-wiL Co., Cleveland, O.

PIPE REAMERS

See Reamers, Pipe

PIPE REPAIR CLAMPS

See Clamps, Pipe Repair

PIPE, SPIRAL, RIVETED AND WELDED

Armco Drainage & Metal Products, Inc., Middletown, O.
Biggs Boiler Wks., Co., The, E. Akron, O.
Naylor Pipe Co., Chicago, Ill.
Nikoh Tube Co., Chicago, Ill.
●Taylor Forge & Pipe Wks., Chicago, Ill.

PIPE, STEEL, ALLOY

Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
●Globe Steel Tubes Co., Milwaukee, Wis.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, BUTT AND LAP WELDED

●Bethlehem Steel Co., Bethlehem, Pa.
Byers Co., A. M., Pittsburgh, Pa.
Chicago Metal Mfg. Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Fretz-Moon Tube Co., Butler, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y. (Specially fabricated)
Smith Corp., A. O., Milwaukee, Wis.
South Chester Tube Co., Chester, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Tippett & Wood, Phillipsburgh, N. J. (12 in. and larger)
●Wheatland Tube Co., Philadelphia, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, SEAMLESS

Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, STAINLESS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
Michigan Pipe Co., Bay City, Mich.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Republic Steel Corp., Steel and Tubes Div., Cleveland, O.
Timken Roller Bearing Co., Canton, O.
Trent Tube Co., East Troy, Wis.
Tri-Clover Machine Co., Kenosha, Wis.

PIPE, STONEWARE

General Ceramics & Steatite Corp., Keasbey, N. J.
Knight, Maurice A., Akron, O.
United States Stoneware Co., New York, N. Y.

PIPE SUPPORTS

See Hangers and Supports, Pipe

PIPE, TIN

Alpha Metals, Inc., Brooklyn, N. Y.
Division Lead Co., Chicago, Ill.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
National Lead Co., New York, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.

PIPE TONGS

See Tongs, Pipe

PIPE, TUBING, FITTINGS AND VALVES, CARBON AND GRAPHITE

General Ceramics & Steatite Corp., Keasbey, N. J.
National Carbon Co., Div. of Union Carbide & Carbon Corp., New York, N. Y.

PIPE AND TUBING, LEAD AND LEAD ALLOY

Alpha Metals, Inc., Brooklyn, N. Y.
Division Lead Co., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Gardiner Metal Co., Chicago, Ill.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Rochester Lead Works, Inc., Rochester, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
United States Stoneware Co., New York, N. Y.

PIPE VISES

See Vises, Pipe

PIPE, VITRIFIED CLAY

Bowerston Shale Co., Bowerston, O.
Cannelton Sewer Pipe Co., RadianTile Div., Chicago, Ill.
●Ric-wiL Co., Cleveland, O.
Robinson Clay Product Co., The, Akron, O.
Stillwater Clay Products Co., The, Cleveland, O.

PIPE, WOOD

American District Steam Co., North Tonawanda, N. Y.
Caldwell Co., W. E., Louisville, Ky.
Michigan Pipe Co., Bay City, Mich.
Santa Fe Tank & Tower Co., Los Angeles, Calif.

PIPE WRENCHES

See Wrenches, Pipe

PIPE, WROUGHT IRON

Byers Co., A. M., Pittsburgh, Pa.

PIPING IDENTIFICATON MARKERS

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PISTON RINGS

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PITOT TUBES

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PITTSBURGH LOCK FORMING MACHINES

See Machines, Pittsburgh Lock Forming

PLASTIC PIPE AND PIPE FITTINGS

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PLASTIC TUBING

See Tubing, Plastic

PLATES, FLOOR AND CEILING

Beaton & Cadwell Mfg. Co., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
G & H Mfg. Co., Philadelphia, Pa.
●Grinnell Co., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keeney Mfg. Co., Newington, Conn.
Little Mfg. Co., M. S., Hartford, Conn.
●Ritter Pattern & Casting Co., Inc., New York, N. Y.
Russell Mfg. Co., John M., Naugatuck, Conn.
●Walworth Co., New York, N. Y.
Zurn Mfg. Co., J. A., Erie, Pa.

PLUG COCKS

See Valves, Plug

PLUG VALVES

See Valves, Plug

PLUGS, FUSIBLE, BOILER

Chicago Specialty Mfg. Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Swift Lubricator Co., Elmira, N. Y.
●Walworth Co., New York, N. Y.

PLUGS, REPAIR, FOR TANKS

Chicago Specialty Mfg. Co., Chicago, Ill.
Kenney Co., L. C., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
U. S. Plug & Fitting Co., Wellington, O.

PORTS, OBSERVATION, BOILER

Bigelow Liptak Corp., Detroit, Mich.
Chicago Fire Brick Co., Chicago, Ill.
●Detroit Stoker Co., Detroit, Mich.
Green Fire Brick Co., Mexico, Mo.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Springfield Boiler Co., Springfield, Ill.

POSITIONERS, WELDING

See Welding and Cutting Apparatus, Oxy-Acetylene

POWER SHEARS

See Shears, Power

PREHEATERS, FUEL OIL

●Alstrom Corp., Bronx, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Brown Fintube Co., The, Elyria, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cooper Co., Clark, Palmyra, N. J.
Crotty Mfg. Co., Flushing, L. I., N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. I Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drying Systems, Inc., Chicago, Ill.
Engineer Co., New York, N. Y.
Falcon Equipment Co., New Brighton, Pa.
●Fluid Systems, Inc., New Haven, Conn.
●General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Griscom-Russell Co., New York, N. Y.
Industrial Engineering & Equipment Co., St. Louis, Mo. (Electric)
Johnson Corp., The, Three Rivers, Mich.
Leahy Mfg. Co., Los Angeles, Calif.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Martin-Quaid Co., Philadelphia, Pa.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Peabody Engineering Corp., New York, N. Y.
Preferred Utilities Mfg. Corp., New York, N. Y.
Reliable Products Mfg. Co., Brooklyn, N. Y.
●Rempe Co., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Sims Co., Erie, Pa.
Staples & Pfeiffer, San Francisco, Calif.
●Struthers Wells Corp., Titusville, Pa.
●Superior Combustion Industries, Inc., New York, N. Y.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I. N. Y.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Whitlock Mfg. Co., Hartford, Conn.
●Wiegand Co., Edwin L., Pittsburgh, Pa. (Electric)
Yula Water Heaters Inc., New York, N. Y.

PREHEATERS AND STRESS RELIEVERS, ELECTRIC, FOR PIPE WELDS

Electric Arc, Inc., Newark, N. J.
Falcon Equipment Co., New Brighton, Pa.
Martin-Quaid Co., Philadelphia, Pa.
Trent Inc., Philadelphia, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

PRE-INSULATED PIPE

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PRESSURE BLOWERS

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PRESSURE CONTROLLERS

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PRESSURE REDUCING VALVES

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PRESSURE REGULATING VALVES

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PRESSURE REGULATORS

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PRESSURE SWITCHES

See Switches, Pressure and Vacuum

PROCESS HEATING SYSTEMS

See Systems, Process Heating, High Temperature

PROCESS STEAM SUPERHEATERS

See Superheaters, Process Steam

PROCESS AND STORAGE TANKS

See Tanks, Process and Storage

PROPELLER FANS

See Fans, Propeller

PROPELLER PUMPS

See Pumps, Propeller

PROPORTIONING PUMPS

See Pumps, Proportioning

PROTECTIVE COATINGS

See Coatings, Protective, for Metal

PROTECTORS, GAGE GLASS

Bache, Semon & Co., New York, N. Y.
Wright-Austin Co., Detroit, Mich.

PROTECTORS, PIPE COVERING

American District Steam Co., North Tonawanda, N. Y.
Bigelow-Liptak Corp., Detroit, Mich.

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Carpenter & Paterson, Inc., East Boston, Mass.
Childers Mfg. Co., Houston, Tex.
Cinder Products Corp., Providence, R. I.
●Grant Wilson Inc., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
●Ric-wiL Co., Cleveland, O.

PSYCHROMETERS, MOTOR ASPIRATED

Bristol Co., The, Waterbury, Conn.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Hill, E. Vernon & Co., Chicago, Ill.
●Powers Regulator Co., Skokie, Ill.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.

PSYCHROMETERS, SLING AND HAND ASPIRATED

American Moistening Co., Providence, R. I.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
General Scientific Equipment Co., Philadelphia, Pa.
●Grinnell Co., Inc., Providence, R. I.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon & Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Parks-Cramer Co., Fitchburg, Mass.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.

PSYCHROSTATS

See Humidistats

PULLEYS AND SHEAVES, FOR BELT DRIVES

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Browning Mfg. Co., Inc., Maysville, Ky.
Central Die Casting & Mfg. Co., Inc., Chicago, Ill. (V belt)
Chicago Die Casting Mfg. Co., Chicago, Ill. (v-type and flat type)
Climax Metal Products Co., Cleveland, O.
Congress Drives Div., Tann Corp., Detroit, Mich. (V belt—fractional and multiple horsepower)
Dayton Rubber Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J. (Steel split)
Doall Co., The, Des Plaines, Ill.
●Dodge Mfg. Corp., Mishawaka, Ind.
Ft. Worth Steel & Machinery Co., Ft. Worth, Texas
Gates Rubber Co., The, Denver, Colo.
Goldens' Foundry & Machine Co., Columbus, Ga. (Cast iron)
Horton Mfg. Co., Minneapolis, Minn. (Variable speed)
Jones Foundry Machine Co., W. A., Chicago, Ill. (flat)
Lau Blower Co., Dayton, O.
Lewellen Mfg. Co., Columbus, Ind.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Maurey Mfg. Corp., Chicago, Ill. (v-belt steel and cast iron)
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
●Schnacke, Inc., Evansville, Ind. (v-type)
Scientiae Tool Co., Dayton, O. (variable pitch)
Speed Selector Inc., Cleveland, O. (variable pitch)
Sprout-Waldron & Co., Muncy, Pa.
Thermoid Co., Trenton, N. J.
Utility Appliance Corp., Beverly Hills, Calif.
V-Belt Clutch Co., Los Angeles, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Webster Electric Co., Racine, Wis.
Wood's Sons Co., T. B., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J. (v-type)

PULVERIZED COAL BURNERS

See Burners, Pulverized Coal

PUMP BASES

See Bases and Pads, Vibration Isolating

PUMP UNITS, FUEL OIL

See Units, Fuel Oil, Heating, Pumping and Straining

PUMP VALVES

See Valves, Pump

PUMPS, BOILER FEED

Aldrich Pump Co., Allentown, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Hydrovac, Div. Pitz Foundry, Inc., Brooklyn, N. Y.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Coffin Co., J. S., Jr., Englewood, N. J.
Columbus Steam Pump Wks., Co., Columbus, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cyclotherm Corp., Oswego, N. Y.
Davidson Co., M. T., New York, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
Decatur Pump Co., Decatur, Ill.
●DeLaval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
●Ingersoll-Rand Co., New York, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Johnson Corp., The, Three Rivers, Mich.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lawrence Pump & Engine Co., Lawrence, Mass.
Lecourtenay Co., Newark, N. J.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
●McDonnell & Miller, Inc., Chicago, Ill.
Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Morris Machine Works, Baldwinsville, N. Y.
●Nash Engineering Co., South Norwalk, Conn.
National Steam Pump Co., Upper Sandusky, O.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Robbins & Myers, Inc., Springfield, O.
Roth Co., Roy E., Rock Island, Ill.
Schaub Engineering Co., Fred H., Chicago, Ill.
●Skidmore Corp., St. Joseph, Mich.
Sta-Rite Products, Inc., Delavan, Wis.
●Sterling, Inc., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
Swaby Mfg. Co., Chicago, Ill.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, CENTRIFUGAL

Alliance Industries, Huntingdon Valley, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Wks., Aurora, Ill.
●Aurora Pump Co., Aurora, Ill.
Barnes Manufacturing Co., Mansfield, O.
Barrett, Haentjens & Co., Hazleton, Pa.
Beckett & Co., Inc., Thomas, Dallas, Tex.
●Bell & Gossett Co., Morton Grove, Ill.
Blaisdell Compressor Co., New York, N. Y.
●Buffalo Pumps, Inc., Buffalo, N. Y.
Bump Pump Co., LaCrosse, Wis.
Carver Pump Co., Muscatine, Ia.
Chain Belt Co., Milwaukee, Wis.
●Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., New York, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
Decatur Pump Co., Decatur, Ill.
●DeLaval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
●Dunham Co., C. A., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries Inc., New Haven, Conn.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Works, Inc., Brooklyn, N. Y.
Frederick Iron & Steel Inc., Frederick, Md.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Gardner-Denver Co., Quincy, Ill.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware)
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gorman-Rupp Co., Mansfield, O.

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Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
●Ingersoll-Rand Co., New York, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
La Bour Co., Inc., The, Elkhart, Ind.
Lawrence Pump & Engine Co., Lawrence, Mass.
Lead Lined Iron Pipe Co., Wakefield, Mass. (lead lined and all lead)
Lecourtenay Co., Newark, N. J.
Lewis & Co., Inc., Chas. S., St. Louis, Mo.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
●Little Giant Vaporizer Co., Inc., Oklahoma City, Okla.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Marlow Pumps, Ridgewood, N. J.
Morey, Dan, Los Angeles, Calif.
Morris Machine Works, Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
National Carbon Co., Div. of Union Carbide & Carbon Corp., New York, N. Y.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pacific Pumping Co., Oakland, Calif.
Palmer Electric Co., Detroit, Mich.
Peerless of America, Inc., Chicago, Ill.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles. Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Red Jacket Mfg. Co., Davenport, Ia.
Saran Lined Pipe Co., Ferndale, Mich. (Saran Lined)
Schneible Co., Claude B., Detroit, Mich.
●Skidmore Corp., St. Joseph, Mich.
Smith Corp., A. O., Milwaukee, Wis.
Standard Electric Mfg. Co., West Berlin, N. J.
Sta-Rite Products, Inc., Delavan, Wis.
●Sterling, Inc., Milwaukee, Wis.
Sumo Pumps, Inc., Stamford, Conn. (for submerged operation)
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
●Trane Co., The, LaCrosse, Wis.
Tri-Clover Machine Co., Kenosha, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Utility Appliance Corp., Beverly Hills, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, CONDENSATION RETURN

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Hydrovac, Div. Pitz Foundry, Inc., Brooklyn, N. Y.
American Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Cochrane Corp., Philadelphia, Pa.
Coffin Co., J. S., Jr., Englewood, N. J.
Columbus Steam Pump Wks. Co., Columbus, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., New York, N. Y.
●Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
Decatur Pump Co., Decatur, Ill.
●De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
●Dunham Co., C. A., Chicago, Ill.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries, Inc., New Haven, Conn.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Faber Engineering Co., Inc., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Heating Assurance, Inc., Spokane, Wash.
●Hoffman Specialty Co., Indianapolis, Ind.
●Ingersoll-Rand Co., New York, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Johnson Corp., The, Three Rivers, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Myers & Bro. Co., F. E., The, Ashland, O.
●Nash Engineering Co., South Norwalk, Conn.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Roth Co., Roy E., Rock Island, Ill.
Schaub Engineering Co., Fred H., Chicago, Ill.
Sellers Engineering Co., Chicago, Ill.
●Skidmore Corp., St. Joseph, Mo.
Sta-Rite Products, Inc., Delavan, Wis.
●Sterling, Inc., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
Swaby Mfg. Co., Chicago, Ill.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Trane Co., The, LaCrosse, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, DEEP WELL, TURBINE

American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Wks., Aurora, Ill.
●Aurora Pump Co., Aurora, Ill.
Cook, Inc., A. D. Lawrenceburg, Ind.
Davidson Co., M. T., New York, N. Y.
Decatur Pump Co, Decatur, Ill. (shallow well)
Deming Co., Salem, O.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Layne & Bowler, Inc., Memphis, Tenn.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div, Food Machinery & Chemical Corp., Los Angeles, Calif.
Red Jacket Mfg. Co., Davenport, Ia.
Smith Corp., A. O., Milwaukee, Wis.
Sta-Rite Products, Inc., Delavan, Wis.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, FIRE

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Auroro, Ill.
Barnes Manufacturing Co., Mansfield, O.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
Cook, Inc., Lawrenceburg, Ind.
Davidson Co., M. T., New York, N. Y.
●De Laval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Gorman-Rupp Co., Mansfield, O.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Layne & Bowler, Inc., Memphis, Tenn.
Lecourtenay Co., Newark, N. J.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Marlow Pumps, Ridgewood, N. J.
Morris Machine Wks., Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Viking Pump Co., Cedar Falls, Ia.
Warren Steam Pump Co., Inc., Warren, Mass.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, HIGH PRESSURE, HYDRAULIC

Aldrich Pump Co., Allentown, Pa.
American Engineering Co., Philadelphia, Pa.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Blackhawk Mfg. Co., Milwaukee, Wis.
Carpenter Mfg. Corp., The, Cleveland, O. (hand)
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., New York, N. Y.
●De Laval Steam Turbine Co., Trenton, N. J.
Dudgeon, Inc, Richard, Brooklyn, N. Y.
Gorman-Rupp Co., Mansfield, O.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Kobe Inc., Div. of Dresser Equipment Co., Huntington Park, Calif.
Milton Roy Co., Philadelphia, Pa.
National Steam Pump Co., Upper Sandusky, O.
Robbins & Myers, Inc., Springfield, O.
Roper Corp., Geo. D., Rockford, Ill.
Sta-Rite Products, Inc., Delavan, Wis.
●Struthers Wells Corp., Titusville, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Viking Pump Co., Cedar Falls, Ia.

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Warren Steam Pump Co., Inc., Warren, Mass.
Watson-Stillman Co., Roselle, N. J.

PUMPS, LIQUID REFRIGERANT CIRCULATING

Alliance Industries, Huntingden Valley, Pa.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
●Chicago Pump Co., Chicago, Ill.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., New York, N. Y.
●De Laval Steam Turbine Co., Trenton, N. J.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
●Frick Co., Waynesboro, Pa.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Lewis & Co., Chas. S., St. Louis, Mo.
Marlow Pumps, Ridgewood, N. J.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Roper Corp., Geo. D., Rockford, Ill.
Roth Co., Roy E., Rock Island, Ill.
Viking Pump Co., Cedar Falls, Ia.
Vilter Mfg. Co., Milwaukee, Wis.
Warren Steam Pump Co., Inc., Warren, Mass.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, PROPELLER

American Well Works, Aurora, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Haertel Co., Walter, Minneapolis, Minn.
●Ingersoll-Rand Co., New York, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Morris Machine Wks., Baldwinsville, N. Y.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Tri-Clover Machine Co., Kenosha, Wis.
Warren Steam Pump Co., Inc., Warren, Mass.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, PROPORTIONING

Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Cochrane Corp., Philadelphia, Pa.
Dearborn Chemical Co., Chicago, Ill.
Duriron Co., Inc., The, Dayton, O.
Jacuzzi Bros., Inc., Richmond, Calif.
Madden & Co., P. E., Chicago, Ill.
Marco Co., Inc., Wilmington, Del.
Milton Roy Co., Philadelphia, Pa.
Nelson Chemical Pumps, Casper, Wyo.
% Proportioneers, Inc., %, Providence, R. I.
Robbins & Myers, Inc., Springfield, O.
Wallace & Tiernan Co., Inc., Newark, N. J.

PUMPS, RECIPROCATING

Aldrich Pump Co., Allentown, Pa.
Altena Foundry & Machine Works, Inc., Lancaster, O.
American Hard Rubber Co., New York, N. Y. (Rubber and Rubber lined)
American-Marsh Pumps, Inc., Battle Creek, Mich
●Binks Mfg. Co., Chicago, Ill.
Columbus Steam Pump Wks., Columbus, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cook, Inc., A. D., Lawrenceburg, Ind.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Davidson Co., M. T., New York, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Deming Co., Salem, O.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc, Pittsburgh, Pa.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
Duro Co., Dayton, O.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Gray Company, Inc., Minneapolis, Minn.
Guild & Garrison, Inc., Brooklyn, N. Y.
Hills-McCanna Co., Chicago, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Ingersoll-Rand Co., New York, N. Y.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Marlow Pumps, Ridgewood, N. J.
Milton Roy Co., Philadelphia, Pa.
Myers & Bro. Co., F. E., The, Ashland, O.
National Steam Pump Co., Upper Sandusky, O.
National Water Lift Inc., Kalamazoo, Mich.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Red Jacket Mfg. Co., Davenport, Ia.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Sta-Rite Products, Inc., Delavan, Wis.
Uniflow Mfg. Co., Erie, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Watson-Stillman Co., Roselle, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, ROTARY

American Engineering Co., Philadelphia, Pa.
American Hard Rubber Co., New York, N. Y. (Rubber and rubber lined)
Beach-Russ Co., New York, N. Y.
Blackmer Pump Co., Grand Rapids, Mich.
Bowser, Inc., Fort Wayne, Ind.
Bump Pump Co., La Crosse, Wis.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Duriron Co., Inc., The, Dayton, O. (Acid resisting)
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries, Inc., New Haven, Conn.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Gray Co., Inc., Minneapolis, Minn.
Hypro Engineering Co., Minneapolis, Minn.
Jabsco Pump Co., Burbank, Calif.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lammert & Mann Co., Chicago, Ill.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Marco Co., Inc, Wilmington, Del.
Martocello & Co., Jos. A., Philadelphia, Pa.
May Oil Burner Div., Gerotor May Corp., Baltimore, Md.
●Nash Engineering Co., South Norwalk, Conn.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Polo Pump Co., Polo, Ill.
Red Jacket Mfg. Co., Davenport, Ia.
Robbins & Myers, Inc., Springfield, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Roper Corp., Geo. D., Rockford, Ill.
Roth Co., Roy E., Rock Island, Ill.
St. Louis Tool Co., St. Louis, Mo.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Sundstrand Machine Tool Co., Hydraulic Div., Rockford, Ill. (for oil burners)
Taber Pump Co., Buffalo, N. Y.
Trimount Rotary Power Co., Dedham, Mass.
Tuthill Pump Co., Chicago, Ill.
Vanton Pump Corp., New York, N. Y.
Viking Pump Co., Cedar Falls, Ia.
Waukesha Foundry Co., Waukesha, Wis.
Webster Electric Co., Racine, Wis.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yale & Towne Mfg. Co., Stamford, Conn.

PUMPS, SEWAGE AND SLUDGE

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Works, Aurora, Ill.
●Aurora Pump Co., Aurora, Ill.
Barnes Manufacturing Co., Mansfield, O.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Frederick Iron & Steel Inc., Frederick, Md.
Gardner-Denver Co., Quincy, Ill.
Gorman-Rupp Co., Mansfield, O.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Works, Oswego, N. Y.
Marlow Pumps, Ridgewood, N. J.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Robbins & Myers, Inc., Springfield, O.
Swaby Mfg. Co., Chicago, Ill.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

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PUMPS, STEAM

American-Marsh Pumps, Inc., Battle Creek, Mich.
Columbus Steam Pump Wks., Co., Columbus, O.
Davidson Co., M. T., New York, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Gardner-Denver Co., Quincy, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
Jacuzzi Bros., Inc., Richmond, Calif.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
National Steam Pump Co., Upper Sandusky, O.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Watson-Stillman Co., Roselle, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, SUMP

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
Barnes Mfg. Co., Mansfield, O.
Barrett, Haentjens & Co., Hazleton, Pa.
Bruner Corp., Milwaukee, Wis.
●Buffalo Pumps, Inc., Buffalo, N. Y.
Chicago Pneumatic Tool Co., New York, N. Y.
●Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Cook, Inc., A. D., Lawrenceburg, Ind.
Davidson Co., M. T., New York, N. Y.
Dean Hill Pump Co., Indianapolis, Ind.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
Duro Co., Dayton, O.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries, Inc., New Haven, Conn.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Friermood Machine Works, Converse, Ind.
Gorman-Rupp Co., Mansfield, O.
Goulds Pump, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
Independent Pneumatic Tool Co., Aurora, Ill.
●Ingersoll-Rand Co., New York, N. Y.
Jabsco Pump Co., Burbank, Calif.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kenco, Inc., Lorain, O.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kol-Master Corp., Oregon, Ill.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Marlow Pumps, Ridgewood, N. J.
Morris Machine Wks., Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Noera Mfg. Co., Div., Chase Brass & Copper Co., Waterbury, Conn.
Pacific Pumping Co., Oakland, Calif.
Peerless of America, Inc., Chicago, Ill.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Penberthy Injector Co., Detroit, Mich.
Peters-Dalton, Inc., Detroit, Mich.
Red Jacket Mfg. Co., Davenport, Ia.
Robbins & Myers, Inc., Springfield, O.
Roth Co., Roy E., Rock Island, Ill.
Schneible Co., Claude B., Detroit, Mich.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Skidmore Corp., St. Joseph, Mich.
Standard Electric Mfg. Co., West Berlin, N. J.
Sta-Rite Products, Inc., Delavan, Wis.
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Uniflow Mfg. Co., Erie, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Wade Mfg. Co., Elgin, Ill.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, VACUUM

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Aminco Refrigeration Products Co., Detroit, Mich.
Barrett, Haentjens & Co., Hazleton, Pa.
Beach-Russ Co., New York, N. Y.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
●Chicago Pump Co., Chicago, Ill.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Daigger & Co., A., Chicago, Ill.
Davidson Co., M. T., New York, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
●De Laval Steam Turbine Co., Trenton, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
●Dunham Co., C. A., Chicago, Ill.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eisler Engineering Co., Inc., Newark, N. J.
Electric Sprayit Co., The, Sheboygan, Wis.
Foster Pump Wks., Inc., Brooklyn, N. Y.
●Foster Wheeler Corp., New York, N. Y.
Fuller Co., Catasaqua, Pa.
Gardner-Denver Co., Quincy, Ill.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware)
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lammert & Mann Co., Chicago, Ill.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
●Nash Engineering Co., South Norwalk, Conn.
National Steam Pump Co., Upper Sandusky, O.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Roots-Connersville Blower Corp., Connersville, Ind.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Skidmore Corp., St. Joseph, Mich.
Stokes Machine Co., F. J., Philadelphia, Pa.
Trimount Rotary Power Co., Dedham, Mass.
Viking Pump Co., Cedar Falls, Ia.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Will Corp., Rochester, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, VACUUM HEATING

American Hydrovac, Div. Pitz Foundry, Inc., Brooklyn, N. Y.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
●Dunham Co., C. A., Chicago, Ill.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Faber Engineering Co., Inc., Philadelphia, Pa.
Gardner-Denver Co., Quincy, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
●Jackson Co., Byron, Los Angeles, Calif.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
●Nash Engineering Co., South Norwalk, Conn.
●Skidmore Corp., St. Joseph, Mich.
●Sterling, Inc., Milwaukee, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, VISCOUS LIQUIDS AND HEAVY MATERIALS

Aldrich Pump Co., Allentown, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Beach-Russ Co., New York, N. Y.
Blackmer Pump Co., Grand Rapids, Mich.
●Buffalo Pumps, Inc., Buffalo, N. Y.
Bump Pump Co., La Crosse, Wis.
●Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Davidson Co., M. T., New York, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
●De Laval Steam Turbine Co., Trenton, N. J.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Engineer Co., New York, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Frederick Iron & Steel Inc., Frederick, Md.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Gray Co., Inc., Minneapolis, Minn.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Jabsco Pump Co., Burbank, Calif.
●Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Madden & Co., P. E., Chicago, Ill.
Marco Co., Inc., Wilmington, Del.
Milton Roy Co., Philadephia, Pa.

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Morris Machine Wks., Baldwinsville, N. Y.
Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Red Jacket Mfg. Co., Davenport, Ia.
Robbins & Myers, Inc., Springfield, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Roper Corp., Geo. D., Rockford, Ill.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Taber Pump Co., Buffalo, N. Y.
Tuthill Pump Co., Chicago, Ill.
Union Steam Pump Co., Battle Creek, Mich.
Vanton Pump Corp., New York, N. Y.
Viking Pump Co., Cedar Falls, Ia.
Warren Steam Pump Co., Inc., Warren, Mass.
Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUNCHES, SHEET METAL

Blackhawk Mfg. Co., Milwaukee, Wis.
Bliss Co., E. W., Canton, O.
Callahan Can Machine Co., Inc., Brooklyn, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Excelsior Tool & Machine Co., East St. Louis, Ill.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Heartley Machine & Tool Co., Toledo, O.
Hendley & Whittemore Co., Beloit, Wis.
Henry & Wright, Div. of Emhart Mfg. Co., Hartford, Conn.
Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
Leslie Welding Co., Chicago, Ill.
M-M-A, Inc., Lancaster, Pa.
New Albany Machine Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Parker-Kalon Corp., New York, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Perkins Machine Co., Warren, Mass.
Reiner & Campbell Co., Inc., Newark, N. J.
Swaine Mfg. Co., Fred J., St. Louis, Mo.
Thor Tool & Die Co., San Leandro, Calif.
Webb Corp., The, Webb City, Mo.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Weidemann Machine Co., Philadelphia, Pa.
Zeh & Hahnemann Co., Newark, N. J.

PURGERS, REFRIGERANT GAS

●Armstrong Machine Works, Three Rivers, Mich.
●Frick Co., Waynesboro, Pa.
●Mueller Brass Co., Port Huron, Mich.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Vilter Mfg. Co., Milwaukee, Wis.
York Corp., York, Pa.

PUSHERS, PIPE, HYDRAULIC

Blackhawk Mfg. Co., Milwaukee, Wis.
Dudgeon, Inc., Richard, Brooklyn, N. Y.
Giant Mfg. Co., Council Bluffs, Ia.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.

RACKS, STORAGE, PIPE

Berger Mfg. Div., Republic Steel Corp., Canton, Ohio

RADIANT HEATING AND COOLING

See Coils and Panels, Radiant Heating, Prefabricated

RADIATION, BASEBOARD, FERROUS

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
●Autorad Inc., Chicago, Ill.
Baseline Mfg. Co., Minneapolis, Minn.
Burnham Corp., Boiler Div., Irvington, N. Y.
●Crane Co., Chicago, Ill.
●Dunham Co., C. A., Chicago, Ill.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
●Rempe Co., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Stedco Products, Wilkes-Barre, Pa.
Sterling Radiator Co., Inc., Westfield, Mass.
●Trane Co., The, La Crosse, Wis.
United States Radiator Corp., Detroit, Mich.
Utica Radiator Corp., Utica, N. Y.
●Vulcan Radiator Co., Hartford, Conn.
Weil-McLain Co., Michigan City, Ind.

RADIATION, BASEBOARD, NON-FERROUS

Airecon Industries, Detroit, Mich.
●Appleman Glass Works, Bergenfield, N. J. (electric glass panel)
Baseline Mfg. Corp., Minneapolis, Minn.
Brown Products Co., New York, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●G & O Mfg. Co., New Haven, Conn.
Huron Boiler Co., Detroit, Mich.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Minimite Co., Chicago, Ill.
National Radiator Co., The, Johnstown, Pa.
Radiant-Ray Radiation, Inc., New Britain, Conn.
●Rittling Corp., Hamburg, N. Y.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Tenney Engineering, Inc., Newark, N. J.
●Vulcan Radiator Co., Hartford, Conn.
●Webster & Co., Warren, Camden, N. J.

RADIANT HEAT THERMOSTATS

See Thermostats, Radiant Heat

RADIANT HEATING ELECTRICAL CONDUCTORS

See Conductors, Electrical, for Radiant Heating

RADIATION, CONVECTION TYPE, FERROUS

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
●Autorad Inc., Chicago, Ill.
Brown Fintube Co., The, Elyria, O.
Dunham Co., C. A., Chicago, Ill.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Rempe Co., Chicago, Ill.
●Rittling Corp., The, Hamburg, N. Y.
Stedco Products, Wilkes-Barre, Pa.
Tenney Engineering Inc., Newark, N. J.
United States Radiator Corp., Detroit, Mich.
●Webster & Co., Warren, Camden, N. J.
Weil-McLain Co., Chicago, Ill.

RADIATION, CONVECTION TYPE, NON-FERROUS

Airecon Industries, Detroit, Mich.
●Airtherm Mfg. Co., St. Louis, Mo.
American Coils Co., Newark, N. J.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Beacon-Morris Corp., Boston, Mass.
Brown Fintube Co., The, Elyria, O.
Brown Products Co., Forest Hills, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
●Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●G. & O. Mfg. Co., New Haven, Conn.
Kehm Corp., The, Chicago, Ill.
●Kramer Trenton Co., Trenton, N. J.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Minimite Co., Chicago, Ill.
●Modine Mfg. Co., Racine, Wis.
National Radiator Co., The, Johnstown, Pa.
●Nesbitt Inc., John J., Philadelphia, Pa.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Republic Products Co., Philadelphia, Pa.
●Rittling Corp., The, Hamburg, N. Y.
●Rome-Turney Radiator Co., Rome, N. Y.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Tenney Engineering Inc., Newark, N. J.
●Trane Co., The, La Crosse, Wis.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Radiator Corp., Detroit, Mich.
Universal Convector Corp., New York, N. Y.
Vapor Heating Corp., Chicago, Ill.
●Webster & Co., Warren, Camden, N. J.
●Young Radiator Co., Racine, Wis.

RADIATION, DIRECT

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Burnham Corp., Boiler Div., Irvington, N. Y.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass. (For aircraft)
Clow & Sons, James B., Chicago, Ill. (Gas fired)
●Crane Co., Chicago, Ill.
Dunkirk Radiator Corp., Dunkirk, N. Y.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Rittling Corp., The, Hamburg, N. Y.
United States Radiator Corp., Detroit, Mich.
Utica Radiator Corp., Utica, N. Y.
Weil-McLain Co., Michigan City, Ind.
Wilson Engineering Corp., Chicago, Ill.

RADIATION, FIN TUBE TYPE

Airecon Industries, Detroit, Mich.
American Coils Co., Newark, N. J.
Auburn Burner Co., Auburn, Ind.
Autorad Inc., Chicago, Ill.

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Baseline Mfg. Co., Minneapolis, Minn.
Brown Products Co., Forest Hills, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●G & O Mfg. Co., New Haven, Conn.
●Kramer Trenton Co., Trenton, N. J.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Minimite Co., Chicago, Ill.
National Radiator Co., The, Johnstown, Pa.
Peerless of America, Inc., Chicago, Ill.
Radiant-Ray Radiation, Inc., New Britain, Conn.
Refrigeration Economics Co., Inc., Canton, O.
●Rempe Co., Chicago, Ill.
●Rittling Corp., The, Hamburg, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Slant-Fin Radiator Corp., Brooklyn, N. Y.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Sterling Radiator Co., Inc., Westfield, Mass.
Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering Inc., Newark, N. J.
●Tilco-Fin-Tubing Div., David E. Kennedy, Inc., Brooklyn, N. Y.
●Trane Co., The, La Crosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
●Vulcan Radiator Co., Hartford, Conn.
●Webster & Co., Warren, Camden, N. J.

RADIATOR AND CONVECTOR HUMIDIFIERS

See Humidifiers for Radiators and Convectors

RADIATOR HANGERS

See Hangers or Brackets, Radiator

RADIATOR ORIFICES

See Orifices, Radiator

RADIATOR ORIFICE VALVES

See Valves, Radiator, Orifice

RADIATOR VALVES

See Valves, Radiator

RADIATOR VENT VALVE HUMIDIFIERS

See Humidifiers, Radiator Vent Valve

RADIATORS, ELECTRIC

Acrow, Inc., Newark, N. J.
Burnham Corp., Boiler Div., Irvington, N. Y.
Conco Engineering Wks., Div. of H. D. Conkey & Co., Mendota, Ill
Meco, Inc., Portland, Ore.
Trent, Inc., Philadelphia, Pa.

RADIATORS, GAS FIRED

Clow & Sons, James B., Chicago, Ill.

RADIATORS, HUMIDIFYING

Murray Mfg. Co., D. J., Wausau, Wis.

RATCHET WRENCHES

See Wrenches, Ratchet

REAMERS, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Beaver Pipe Tools, Inc., Warren, O.
Capewell Mfg. Co., Hartford, Conn.
Crown Die & Tool Co., Chicago, Ill.
Greenfield Tap & Die Corp., Greenfield, Mass.
Independent Pneumatic Tool Co., Aurora, Ill.
Mueller Co., Decatur, Ill.
Nye Tool Co., Chicago, Ill.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Toledo Pipe Threading Machine Co., Toledo, O.

RECIPROCATING PUMPS

See Pumps, Reciprocating

RECORDER-CONTROLLERS, COMBINED TEMPERATURE AND HUMIDITY

American Instrument Co., Silver Spring, Md.
Bristol Co., The, Waterbury, Conn.
Ess Instrument Co., Bergenfield, N. J.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instrument Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Thwing-Albert Instrument Co., Philadelphia, Pa.

RECORDER-CONTROLLERS, HUMIDITY

American Instrument Co., Silver Spring, Md.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
●Johnson Service Co., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.

RECORDER-CONTROLLERS, PRESSURE

Automatic Control Co., St. Paul, Minn.
Bailey Meter Co., Cleveland, O.
Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Scientific Instrument Co., Detroit, Mich.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.

RECORDER-CONTROLLERS, TEMPERATURE

American Instrument Co., Silver Spring, Md.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Scientific Instrument Co., Detroit, Mich.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine & Metals, Inc., Sellersville, Pa.
Wheelco Instrument Co., Chicago, Ill.

RECORDERS, CARBON DIOXIDE

Cole-Sewell Engineering Co., St. Paul, Minn.
Davis Instruments, Div. of Davis Emergency Equipment Co., Inc., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Engelhard, Inc., Charles, Newark, N. J.
Foxboro Co., Foxboro, Mass.
Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.

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Permutit Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

RECORDERS, COMBINED TEMPERATURE AND HUMIDITY

American Instrument Co., Silver Spring, Md.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
● Powers Regulator Co., Skokie, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, DEW POINT

Foxboro Co., Foxboro, Mass.
● Surface Combustion Corp., Toledo, O.

RECORDERS, DRAFT

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

RECORDERS, HUMIDITY

American Instrument Co., Silver Spring, Md.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Garden City Instruments, Inc., Chicago, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Leeds & Northrup Co., Philadelphia, Pa.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
● Powers Regulator Co., Skokie, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, LIQUID LEVEL

Automatic Control Co., St. Paul, Minn.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Defender Instrument & Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Healy Ruff Co., St. Paul, Minn.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Liquidometer Corp., Long Island City, N. Y.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
● Taylor Instrument Companies, Rochester, N. Y.
Uehling Instrument Co., Paterson, N. J.
Westinghouse Electric Corp., Pittsburgh, Pa.
● Yarnall-Waring Co., Philadelphia, Pa.

RECORDERS, OXYGEN

Bailey Meter Co., Cleveland, O.
Hagan Corp., Pittsburgh, Pa.
● Hays Corp., Michigan City, Ind.
Mine Safety Appliances Co., Pittsburgh, Pa.

RECORDERS, PRESSURE AND VACUUM

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Electro Products Laboratories, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Garden City Instruments, Inc., Chicago, Ill.
Giannini & Co., Inc., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Stokes Machine Co., F. J., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
● Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Uehling Instrument Co., Paterson, N. J.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, SMOKE DENSITY

Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
● Combustion Control Corp., Cambridge, Mass.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Edwards, L. V., Rockville Center, N. Y.
Ess Specialty Corp., Bergenfield, N. J.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
General Power Plant Corp., New York, N. Y.
Leeds & Northrup Co., Philadelphia, Pa.

RECORDERS, TEMPERATURE

American Instrument Co., Silver Spring, Md.
● Armstrong Machine Wks., Three Rivers, Mich.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
● Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Engelhard, Inc., Charles, Newark, N. J.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
Garden City Instruments, Inc., Chicago, Ill.
Gotham Instrument Co., Div., American Machine & Metals, Inc., Philadelphia, Pa.
H-B Instrument Co., Philadelphia, Pa.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Moore Products Co., Philadelphia, Pa.
Palmer Thermometers, Inc., Cincinnati (Norwood), O. (Mercury-actuated)
Penn Industrial Instrument Corp., Philadelphia, Pa.
● Powers Regulator Co., Skokie, Ill.
Precision Scientific Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
● Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.
Wheelco Instruments Co., Chicago, Ill.

RECORDING THERMOMETERS

See Recorders, Temperature

RECOVERY EQUIPMENT, AIR

See Adsorbers, Odor

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REDUCERS, SPEED

Abart Gear & Machine Co., Chicago, Ill.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Bodine Electric Co., Chicago, Ill.
Boston Gear Wks., Inc., North Quincy, Mass.
Brown-Brockmeyer Co., Inc., Dayton, O.
Chicago Die Casting Mfg. Co., Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Doall Co., The, Des Plaines, Ill.
Dodge Mfg. Corp., Mishawaka, Ind.
Falk Corp., Milwaukee, Wis.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Graham Transmissions, Inc., Milwaukee, Wis.
Janette Electric Mfg. Co., Morton Grove, Ill.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Lima Electric Motor Co., The, Lima, O.
Link Belt Co., Philadelphia, Pa.
Medart Co., St. Louis, Mo.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Poole Foundry & Machine Co., Baltimore, Md.
Reliance Electric & Engineering Co., Cleveland, O.
Shallcross Controls, Inc., Milwaukee, Wis.
Smith Corp., Winfield H., Springville, N. Y.
Star-Kimble Motor Div., Miehle Prntg. Press & Mfg. Co., Bloomfield, N. J.
Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Westinghouse Electric Corp., Pittsburgh, Pa.

REFRACTORIES AND REFRACTORY CEMENT

Allen Co., Robert G., Mechanicsville, N. Y.
●Armstrong Cork Co., Lancaster, Pa.
●Babcock & Wilcox Co., New York, N. Y.
Basic Refractories, Inc., Cleveland, O.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chicago Fire Brick Co., Chicago, Ill.
Fireline Stove & Furnace Lining Co., Chicago, Ill.
General Insulating Products Co., Brooklyn, N. Y.
Green Fire Brick Co., Mexico, Mo.
Johns-Manville, New York, N. Y.
Kellogg Co., M. W., The, New York, N. Y.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Co., St. Louis, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Monogram Products Co., Inc., Philadelphia, Pa.
Nebel Mfg. Co., Cleveland, O.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
Rutland Fire Clay Co., Rutland, Vt.
S.O.S. Products Co., Inc., Brooklyn, N. Y.
Saverite Engineering Co., Hoboken, N. J.
Standard Fuel Engineering Co., Detroit, Mich.
Taylor Sons Co., Charles, Cincinnati, O.
United States Stoneware Co., New York, N. Y.
Walsh Refractories Corp., St. Louis, Mo.
●Zonolite Co., Chicago, Ill.

REFRIGERANT DEHYDRATORS

See Dehydrators, Refrigerant

REFRIGERANT FILTERS

See Filters, Refrigerant

REFRIGERANT GAS PURGERS

See Purgers, Refrigerant Gas

REFRIGERANTS

Ansul Chemical Co., Refrigeration Div. Marinette, Wis. (methyl chloride, sulphur dioxide)
Armour and Co., Ammonia Div., Chicago, Ill. (ammonia)
Dow Chemical Co., The, Midland, Mich.
du Pont de Nemours & Co., Inc., E. I. Polychemicals Dept., Wilmington, Del. (National anhydrous ammonia)
du Pont de Nemours & Co., Inc., E. I., Kinetic Chemicals Div., Wilmington, Del. ("Freon" fluorinated hydro carbon refrigerants)
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept., Wilmington, Del. (Methyl chloride and methylene chloride)
Eston Chemicals, Inc., Los Angeles, Calif.
Liquid Carbonic Corp., Chicago, Ill. (carbon dioxide)
Monsanto Chemical Co., Merimac Div., Boston, Mass. (anhydrous ammonia)
Pennsylvania Salt Mfg. Co., Philadelphia, Pa. (ammonia)
Pure Carbonic, Inc., Div. of Air Reduction Co., Inc., New York, N. Y. (carbon dioxide)
Solvay Sales Div., Allied Chemical & Dye Corp., New York, N. Y.
Virginia Smelting Co., West Norfolk, Va., (Methyl chloride, liquid sulphur dioxide, methylene chloride)

REFRIGERATING COMPRESSORS

See Compressors, Refrigerating

REFRIGERATION ACCUMULATORS

See Accumulators, Refrigeration

REFRIGERATION CONTROLS

See Valves, Refrigeration

REFRIGERATION FITTINGS

See Fittings, Refrigeration

REFRIGERATION MANIFOLDS

See Manifolds, Refrigeration

REFRIGERATION VALVES

See Valves, Refrigeration

REGISTERS

See also Diffusers; Grilles; Panels, Perforated, for Air Diffusion

A. & A. Register Co., Cleveland, O.
●A-J Mfg. Co., Kansas City, Mo.
Acme Mfg. Co., Philadelphia, Pa.
Air Control Products, Inc., Coopersville, Mich.
●Auer Register Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Best Register Co., Milwaukee, Wis.
Char-Gale Mfg. Co., Minneapolis, Minn.
Controlair Mfg. Co., Los Angeles, Calif.
Diamond Mfg. Co., Wyoming, Pa.
●Dole Valve Co., The, Chicago, Ill. (Thermostatic air control)
Empire Ventilation Equipment Co., Long Island City, N. Y.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Holland, Mich.
Hastings Air Conditioning Co., Hastings, Neb.
●Hendrick Mfg. Co., Carbondale, Pa.
●Independent Register Co., Cleveland, O.
Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Krauser-Boyd, Inc., North Tonawanda, N. Y.
Lima Register Co., The, Lima, O.
Louvra Corp., The, Union, N. J.
Martin Metal Products Corp., Ferndale, Mich.
Metal Carrier Corp., Grand Rapids, Mich.
Midco Register Corp., St. Paul, Minn.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Rock Island Register Co., Rock Island, Ill.
Smith Co., J. B., Philadelphia, Pa.
●Standard Stamping & Perforating Co., Chicago, Ill.
Stewart Mfg. Co., Inc., Cedar Grove, N. J.
●Titus Mfg. Corp., Waterloo, Ia.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Register Co., Battle Creek, Mich.
Viking Mfg. Corp., Cleveland, O.
Young Regulator Co., Cleveland, O.

REGISTER UNITS, FOR SECONDARY AIR SUPPLY FOR OIL BURNERS

Barber-Colman Co., Rockford, Ill.
Faber Engineering Co., Inc., Philadelphia, Pa.

REGULATORS, AIR VELOCITY

Barber-Colman Co., Rockford, Ill.
●Hastings Instrument Co., Inc., Hampton, Va.
Hays Corp., Michigan City, Ind.
●Johnson Service Co., Milwaukee, Wis.
Shallcross Controls, Inc., Milwaukee, Wis.
●Taylor Instrument Companies, Rochester, N. Y.

REGULATORS, DAMPER SETS

A-P Controls Corp., Milwaukee, Wis.
Acme Mfg. Co., Philadelphia, Pa.
Acro Mfg. Co., The, Columbus, O.
Adams Co., The, Dubuque, Ia.
Air Control Products, Inc., Coopersville, Mich.
Automatic Devices Co., Inc., Western Springs, Ill.
Barber-Colman Co., Rockford, Ill.
Cole-Sewell Engineering Co., St. Paul, Minn.
Crown Controls Co., Inc., New Bremen, O.
Detroit Lubricator Co., Detroit, Mich.
Field Control Div., H. D. Conkey & Co., Mendota, Ill.
●Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Fossum, M. H., St. Paul, Minn.
General Controls Co., Glendale, Calif.

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Gerett Corp., M. A., Milwaukee, Wis.
Goese Mfg. Co., Milwaukee, Wis.
Hart & Cooley Mfg. Co., Holland, Mich.
Kerentoff, G. L., Cincinnati, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Parker-Kalon Corp., New York, N. Y.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Sampsel Time Control, Inc., Spring Valley, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
●Trane Co., The, LaCrosse, Wis.
United States Register Co., Battle Creek, Mich.
Young Regulator Co., Cleveland, O.

REGULATORS, DRAFT, COMBUSTION

Askania Regulator Co., Chicago, Ill.
Automatic Devices Co., Inc., Western Springs, Ill.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Campbell Engineering Co., Appleton, Wis.
Canton Stoker Corp., Canton, O.
●Cash Co., A. W., Decatur, Ill.
Cleveland Fuel Equipment Co., Cleveland, O.
Cole-Sewell Engineering Co., St. Paul, Minn.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Engineer Co., New York, N. Y.
Engineered Products Co., Philadelphia, Pa.
●Field Control Div., H. D. Conkey & Co., Mendota, Ill.
●Foster Wheeler Corp., New York, N. Y.
Foxboro Co., Foxboro, Mass.
Fuelguard Co., Dallas, Tex.
General Blower Co., Inc., Philadelphia, Pa.
General Power Plant Corp., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
●Illinois Engineering Co., Chicago, Ill.
Kol-Master Corp., Oregon, Ill.
Krueger Sentry Gauge Co., Green Bay, Wis.
Leahy Mfg. Co., Los Angeles, Calif.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill. (Industrial)
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Sampsel Time Control, Inc., Spring Valley, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Simplex Mfg. Co., Fond du Lac, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
●Webster Engineering Co., Tulsa, Okla.

REGULATORS, FLUID FLOW, FOR CONSTANT VOLUME

Independent of Pressure

Askania Regulator Co., Chicago, Ill.
Kates Co., W. A., Deerfield, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O
Penn Industrial Instrument Corp., Philadelphia, Pa.
Taco Heaters, Inc., Providence, R. I.

REGULATORS, LEVEL, LIQUID

Askania Regulator Co., Chicago, Ill.
Automatic Control Co., St. Paul, Minn.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Belfield Valve, Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Boylston Steam Specialty Co., Chicago, Ill.
Bristol Co., The, Waterbury, Conn.
Burrows Mfg. Co., F. A. York, Pa.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Defender Instrument & Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Fischer & Porter Co., Hatboro, Pa.
●Fisher Governor Co., Marshalltown, Ia.
Foxboro Co., Foxboro, Mass.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Golden-Anderson Specialty Co., Pittsburgh, Pa.
Griscom-Russell Co., The, New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Johnson Corp., The, Three Rivers, Mich.
●Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., North Bergen, N. J.
Kisco Boiler & Engineering Co., St. Louis, Mo.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Magnetrol, Inc., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Northern Equipment Co., Erie, Pa.
●Penn Controls, Inc., Goshen, Ind.
Penn Industrial Instrument Corp., Philadelphia, Pa.
R-S Products Corp., Philadelphia, Pa.
●Sarco Co., Inc., New York, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
●United Electric Controls Co., Watertown, Mass.

REGULATORS, PRESSURE, AIR

American Meter Co., Inc., New York, N. Y.
Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
●Binks Mfg. Co., Chicago, Ill.
Boylston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
CCA Products, Inc., Glendale, Calif.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
DeVilbiss Co., The, Toledo, O.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
Greiner Co., Emil, New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Keller Tool Co., Grand Haven, Mich.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Mason-Nielan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
Monitor Controller Co., The, Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Englewood, Colo.
North Penn Co., New York, N. Y.
Norwalk Valve Co., Norwalk, Conn.
Paasche Airbrush Co., Chicago, Ill.
●Penn Controls, Inc., Goshen, Ind.
R-S Products Corp., Philadelphia, Pa.
Rockwell Mfg. Co., Meter and Valve Div., Pittsburgh, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Spray Engineering Co., Somerville, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Squires Co., C. E., The Cleveland, O.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.

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●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Tryco Products, Inc., Westfield, Mass.
●United Electric Controls Co., Watertown, Mass.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

REGULATORS, PRESSURE, GAS

American District Steam Co., North Tonawanda, N. Y.
American Meter Co., Inc., New York, N. Y.
Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Mfg. Co., Cleveland, O.
Climax Metal Products Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Foxboro Co., Foxboro, Mass.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
●General Controls Co., Glendale, Calif.
Greiner Co., Emil, New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.
Hays Corp., Michigan City, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Industrial Gas Div., Liquid Carbonic Corp., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
Monitor Controller Co., The, Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Englewood, Colo.
North American Mfg. Co., Cleveland, O.
Norwalk Valve Co., South Norwalk, Conn.
●Penn Controls, Inc., Goshen, Ind.
Positive Control Co., The, Cincinnati, O.
●Powers Regulator Co., Skokie, Ill.
R-S Products Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill. (Industrial)
Rockwell Mfg. Co., Meter and Valve Div., Pittsburgh, Pa.
Ruggles Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Squires Co., C. E., The, Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thermac Co., Los Angeles, Calif.
Trerice Co., H. O., Detroit, Mich.
●United Electric Controls Co., Watertown, Mass.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

REGULATORS, PRESSURE, HOT WATER HEATING SYSTEMS

Bailey Co., Chas., M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Clark Mfg. Co., Cleveland, O.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
●Fisher Governor Co., Marshalltown, Ia.
●Illinois Engineering Co., Chicago, Ill.
Kainer and Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Mueller Co., Decatur, Ill.
●Penn Controls, Inc., Goshen, Ind.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Squires Co., C. E., The, Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Watts Regulator Co., Lawrence, Mass.
●White-Rodgers Electric Co., St. Louis, Mo.
Yula Water Heaters Inc., New York, N. Y.

REGULATORS, PRESSURE, LIQUID

Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Automatic Control Co., St. Paul, Minn.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Controller Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Foxboro Co., Foxboro, Mass.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
●Healy Ruff Co., St. Paul, Minn.
Hubbell Corp., Mundelein, Ill.
●Johnson Service Co., Milwaukee, Wis.
Justus Steam Trap Co., Napanoch, N. Y.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
Monitor Controller Co., The, Boston, Mass.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Norgren Co., C. A., Englewood, Colo.
●Penn Controls, Inc., Goshen, Ind.
●Powers Regulator Co., Skokie, Ill.
R-S Products Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Squires Co., C. E., The, Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Tryco Products, Inc., Westfield, Mass.
●United Electric Controls Co., Watertown, Mass.
Warren Engineering Co., Broadway, N. J.

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Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
●White-Rodgers Electric Co., St. Louis, Mo.
Williams Gauge Co., The, Pittsburgh, Pa. (Feed water)

REGULATORS, STATIC PRESSURE, AIR DUCT

Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
●Cash Co., A. W., Decatur, Ill.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Hays Corp., Michigan City, Ind.
●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Skokie, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.

REGULATORS, TEMPERATURE

A-P Controls Corp., Milwaukee, Wis.
Acro Mfg. Co., The, Columbus, O.
●Aerco Corp., Englewood, N. J.
American Instrument Co., Silver Spring, Md.
Atlas Valve Co., Newark, N. J.
Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Western Springs, Ill.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
●Bell & Gossett Co., Morton Grove, Ill.
Bristol Co., The, Waterbury, Conn.
Burling Instrument Co., South Orange, N. J.
Cooper Co., Clark, Palmyra, N. J.
Crown Controls Co., Inc., New Bremen, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
Eastern Industries, Inc., New Haven, Conn.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Farris Stacon Corp., Palisades Park, N. J.
Fenwal, Inc., Ashland, Mass.
Foster Engineering Co., Union, N. J.
Foxboro Co., Foxboro, Mass.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hagan Corp., Pittsburgh, Pa.
Hart Mfg. Co., The, Hartford, Conn.
Hays Corp., Michigan City, Ind.
Heat Timer Corp., New York, N. Y.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Keckley Co., O. C., Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Lawler Automatic Controls, Inc., Mount Vernon, N. Y.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Jas. P., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
McCorkle Co., D. H., Berkeley, Calif.
●Mercoid Corp., Chicago, Ill.
Miller-Harris Instrument Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Penn Controls, Inc., Goshen, Ind.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Skokie, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
●Spence Engineering Co., Inc., Walden, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Squires Co., C. E., The, Cleveland, O.
●Sterling, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Thermac Co., Los Angeles, Calif.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●United Electric Controls Co., Watertown, Mass.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Wheelco Instruments Co., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.

RELAYS, ELECTRICAL

Advance Electric and Relay Co., Burbank, Calif.
●Allen-Bradley Co., Milwaukee, Wis.
Allied Control Co., Inc., New York, N. Y.
American Gas Accumulator Co., Elizabeth, N. J. (time delay)
American Instrument Co., Silver Spring, Md.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Autempco Corp., New York, N. Y.
Automatic Electric Mfg. Co., Mankato, Minn.
●Automatic Switch Co., Orange, N. J.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
B/W Controller Corp., Birmingham, Mich.
Barber-Colman Co., Rockford, Ill.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Clark Controller Co., Cleveland, O.
Consolidated Car Heating Co., Inc., Albany, N. Y.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer Inc., Milwaukee, Wis.
Davis & Co., Dean W., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Durakool, Inc., Elkhart, Ind.
Edison, Inc., Thos. A., Instrument Div., West Orange, N. J.
Electro-Switch & Controls Inc., Culver City, Calif.
Ess Instrument Co., Bergenfield, N. J.
●General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gleason-Avery, Inc., Auburn, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Hart Mfg. Co., The, Hartford, Conn.
H-B Instrument Co., Philadelphia, Pa.
Industrial Engineering Corp., Terre Haute, Ind.
Leach Relay Co., Los Angeles, Calif.
McCorkle Co., D. H., Berkeley, Calif.
McQuay-Norris Mfg. Co., St. Louis, Mo.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Monitor Controller Co., The, Boston, Mass.
National Time & Signal Corp., Detroit, Mich.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
Potter & Brumfield Sales Co., Princeton, Ind.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
R-S Products Corp., Philadelphia, Pa.
Sampsel Time Control, Inc., Spring Valley, Ill.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Struthers-Dunn, Inc., Philadelphia, Pa.
Synchro-Start Products, Inc., Chicago, Ill.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Thrush & Co., H. A., Peru, Ind.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●Ward Leonard Electric Co., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.
Weston Electrical Instrument Corp., Newark, N. J.
●White-Rodgers Electric Co., St. Louis, Mo.
Zenith Electric Co., Chicago, Ill.

RELIEF VALVES

See Valves, Relief

REPAIR CLAMPS

See Clamps, Pipe Repair

REPAIR PLUGS FOR TANKS

See Plugs, Repair, for Tanks

RESEATERS, VALVE

Chicago Specialty Mfg. Co., Chicago, Ill.
Economy Valve Seat Co., Chicago, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Leavitt Machine Co., Orange, Mass.
Skinner Co., M. B., South Bend, Ind.
Standard Reseater Corp., New York, N. Y.

REVERSE REFRIGERATION CYCLE UNITS

See Units, Air Conditioning, Reverse Refrigeration Cycle

RINGS, PISTON, FOR COMPRESSORS

Double Seal Ring Co., Fort Worth, Tex.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Perfect Circle Corp., Hagerstown, Md.
Piston Ring Div., Koppers Co., Inc., Baltimore, Md.
Sealed Power Corp., Muskegon, Mich.

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RINGS, WELDING

Flori Pipe Co., The, St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Midwest Piping & Supply Co., Inc., St. Louis, Mo.
●Tube Turns, Inc., Louisville, Ky.
Wedge Protectors, Inc., Cleveland, O.

ROD, GAS WELDING

Air Reduction Sales Co., New York, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
American Steel & Wire Co., United States Steel Corp., Subsidiary, Cleveland, O.
Atlantic Steel Co., Atlanta, Ga.
Bridgeport Brass Co., Bridgeport, Conn.
Chemalloy Associates, Santee, Calif.
Crucible Steel Co. of America, New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Duraloy Co., Scottdale, Pa. (Stainless)
Eutectic Welding Alloys Corp., New York, N. Y.
International Nickel Co., Inc., The, New York, N. Y.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Marquette Mfg. Co., Minneapolis, Minn.
Maurath, Inc., Cleveland, O.
Mir-O-Col Alloy Co., Los Angeles, Calif. (for hard facing)
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Page Steel & Wire Division of American Chain & Cable Co., Inc., Monessen, Pa.
●Revere Copper and Brass, Incorporated, New York, N. Y.
●Youngstown Sheet & Tube Co., Youngstown, O.

ROLLER BEARINGS

See Bearings, Roller

ROOF COOLERS

See Systems, Roof Spraying

ROOF SPRAYING SYSTEMS

See Systems, Roof Spraying

ROOF VENTILATORS

See Ventilators, Roof

ROOM HUMIDIFIERS

See Humidifiers, Unit, Room Type; and Units, Air Conditioning, Winter

ROOM THERMOSTATS

See Thermostats, Room or Wall

ROTARY PUMPS

See Pumps, Rotary

RUBBER BELTING

See Belting, Flat, Rubber

RUBBER PACKING

See Packing, Rubber and Synthetic

RUBBER PIPE

See Pipe, Hard Rubber

SADDLE VALVES

See Valves, Saddle

SAFETY VALVES

See Valves, Safety, Steam

SCAFFOLDS, PORTABLE

American Ladder & Scaffold Co., Miami, Fla.
Beaver Art Metal Corp., Ellwood City, Pa.
Up-Right Scaffolds, Berkeley, Calif.

SCALE CONTROL

See Devices, Electrolytic; Treatment, Steam System; Treatment, Water

SCALE REMOVAL, CHEMICAL SERVICE FOR

Anderson-Stolz Corp., Kansas City, Mo.
Aqua Electric Scale Control, Inc., Cleveland, O. (electric scale control)
Brown Electro Co., Oklahoma City, Okla. (electrolytic protector)
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dearborn Chemical Co., Chicago, Ill.
Dowell Inc., Tulsa, Okla.
Madden & Co., P. E., Chicago, Ill.
Oakite Products, Inc., New York, N. Y.
O'Brien Industries, Caldwell, N. J.

SCREENS, SUN REFLECTING

Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Kane Mfg. Corp., Kane, Pa.

SCREWS, SHEET METAL

Aluminum Co. of America, Pittsburgh, Pa.
American Screw Co., Willimantic, Conn.
Continental Screw Co., New Bedford, Mass.
Elco Tool & Screw Corp., Rockford, Ill.
Industrial Screw Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
National Lock Co., Inc., Rockford, Ill.
Parker-Kalon Corp., New York, N. Y.
Pheoll Mfg. Co., Chicago, Ill.
Rockford Screw Products Co., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Shakeproof, Inc., Chicago, Ill.
United States Register Co., Battle Creek, Mich.

SEALS, SHAFT, MECHANICAL

Cook Electric Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Felt Products Mfg. Co., Chicago, Ill.
Garlock Packing Co., Palmyra, N. Y.
Johns-Manville, New York, N. Y.
Morganite, Inc., Carbon Specialties Div., Long Island City, N. Y.
Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Rotary Seal Co., Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Sealol Corp., Providence, R. I.
Syntron Co., Homer City, Pa.

SEAMLESS PIPE

See Pipe, Steel, Seamless

SEPARATORS, AIR

Adams Co., Inc., R. P., Buffalo, N. Y.
Air-Line Engineering Co., Cleveland, Ohio
Anderson Co., V. D., The, Cleveland, O.
●Binks Mfg. Co., Chicago, Ill.
Bowser, Inc., Fort Wayne, Ind.
Centrifix Corp., Cleveland, O.
Clark Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
DeVilbiss Co., The, Toledo, O.
●Dollinger Corp., Rochester, N. Y.
Electric Sprayit Co., The, Sheboygan, Wis.
Gasflux Co., Mansfield, O.
Goodyer Industries, Inc., Chicago, Ill.
Hagan Corp., Pittsburgh, Pa.
●Illinois Engineering Co., Chicago, Ill.
Johnson Corp., Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Kraissl Co., Inc., The, Hackensack, N. J.
Leavitt Machine Co., Orange, Mass.
Logan Engineering Co., Chicago, Ill.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Spencer Turbine Co., Hartford, Conn.
Spray Engineering Co., Somerville, Mass.
Strong,Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Textile Corp., Chicago, Ill.
Trerice Co., H. O., Detroit, Mich.
Wright-Austin Co., Detroit, Mich.

SEPARATORS, FLANGE

Kraissl Co., Inc., The, Hackensack, N. J.
Williams & Co., J. H., Buffalo, N. Y.

SEPARATORS, STEAM AND OIL

●Acme Industries, Inc., Jackson, Mich.
Adams Co., Inc., R. P., Buffalo, N. Y.
●American District Steam Co., North Tonawanda, N. Y.
Aminco Refrigeration Products Co., Detroit, Mich.
Anderson Co., V. D., The, Cleveland, O.
Armstrong Co., Richard M., Westchester, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Centrifix Corp., Cleveland, O. (Gas and Vapor)
Clark Mfg. Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
●Fisher Governor Co., Marshalltown, Ia.

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Goodyer Industries, Inc., Chicago, Ill.
Graver Water Conditioning Co., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
Hoppes Mfg. Co., Inc., Springfield, O.
●Illinois Engineering Co., Chicago, Ill.
Johnson Corp., The, Three Rivers, Mich.
Kieley & Mueller, Inc., North Bergen, N. J.
Kraissl Co., Inc., The, Hackensack, N. J.
Morehead Mfg. Co., Detroit, Mich.
National Valve & Mfg. Co., Pittsburgh, Pa.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Temprite Products Corp., Birmingham, Mich.
Textite Corp., Chicago, Ill.
Thermix Corp., The, Greenwich, Conn.
Velan Engineering Co., Jersey City, N. J.
Wabash Mfg. Co., Chicago, Ill.
Warner Lewis Co., Tulsa, Okla.
●Webster & Co., Warren, Camden, N. J.
Wilson Engineeering Corp., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
Wright-Austin Co., Detroit, Mich.

SEWAGE EJECTORS

See Ejectors, Sewage

SEWAGE PUMPS

See Pumps, Sewage

SHAFT SEALS, MECHANICAL

See Seals, Shaft, Mechanical

SHAFTS, FLEXIBLE, PUSH-PULL, FOR CONTROL

Arens Controls, Inc., Evanston, Ill.
Mall Tool Co., Chicago, Ill.
Piezo Mfg. Corp., New York, N. Y.
Stow Mfg. Co., Binghamton, N. Y.

SHEARS, ELECTRICAL, PORTABLE

Black & Decker Mfg. Co., Towson, Md.
G. D. S. Machinery & Supply Co., Inc., New York, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
M-M-A, Inc., Lancaster, Pa.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Skilsaw, Inc., Chicago, Ill.
Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.

SHEARS, POWER

Barth Mfg. Co., Milldale, Conn.
Bertsch & Co., Inc., Cambridge City, Ind.
Bliss Co., E. W., Detroit, Mich.
Buckeye Tools Corp., Dayton, O.
●Buffalo Forge Co., Buffalo, N. Y.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Cleveland Crane & Eng. Co., Steelweld Div., Wickliffe, O.
Diamond Machine Tool Co., Los Angeles, Calif.
Dreis Co., Ltd., Edward J., San Carlos, Calif.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Famco Machine Co., Racine, Wis.
Frederick Iron & Steel Inc., Frederick, Md.
H-A Mfg. Co., York, Pa.
Heartley Machine & Tool Co., Toledo, O.
Hendley & Whittemore, Beloit, Wis.
Kling Bros. Engineering Works, Chicago, Ill.
Libert Machine Co., Green Bay, Wis.
Marshalltown Mfg. Co., Marshalltown, Ia.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
Quickwork Div., Whiting Corp., Harvey, Ill.
St. Louis Tool Co., St. Louis, Mo.
Stamco Inc., New Bremen, Ohio
Whiting Corp., Harvey, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Wysong & Miles, Greensboro, N. C.

SHEARS AND SNIPS, HAND

Bartlett Mfg. Co., Detroit, Mich.
Beverly Shear Mfg. Co., Chicago, Ill.
Black & Decker Mfg. Co., Towson, Md. (electrically driven)
Bremil Mfg. Co., Erie, Pa.
Champion Blower & Forge Co., Lancaster, Pa.
Crescent Tool Co., Jamestown, N. Y.
Excelsior Tool & Machine Co., East St. Louis, Ill.
G. D. S. Machinery & Supply Co., Inc., New York, N. Y.
Henkel-Clauss Co., The, Fremont, O.
Kidder Mfg. Co., Inc., J. F., Burlington, Vt. (Angle)
Klenk's Aviation Snips, Wilmington, Del.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Pacific Machine & Iron Wks., Tacoma, Wash.
Peck, Stow & Wilcox Co., Southington, Conn.
Snap-on Tools Corp., Kenosha, Wis.
Thor Tool & Die Co., San Leandro, Calif.
Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Wiss & Sons Co., J., Newark, N. J.

SHEAVES

See Pulleys and Sheaves, for Belt Drives

SHEET METAL BRAKES

See Brakes, Sheet Metal

SHEET METAL DUCTS

See Ducts and Duct Fittings, Prefabricated

SHEET METAL FITTINGS

See Ducts and Duct Fittings, Prefabricated

SHEET METAL PUNCHES

See Punches, Sheet Metal

SHEET, ALUMINUM

Aluminum Co. of America, Pittsburgh, Pa.
American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
Colonial Alloys Co., Metals Div., Philadelphia, Pa.
Fairmont Aluminum Co., Fairmont, W. Va.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Revere Copper and Brass Inc., New York, N. Y.
Reynolds Metals Co., Louisville, Ky.

SHEETS, ALUMINUM COATED

Armco Steel Corp., Middletown, O.

SHEETS AND BOARD, NON-METALLIC, FOR DUCT CONSTRUCTION

Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Celotex Corp., The, Chicago, Ill.
Grant Wilson Inc., Chicago, Ill.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
Keystone Asphalt Products Co., Chicago, Ill.
Ruberoid Co., New York, N. Y.
Sall Mountain Co., Hamilton, O.
Technical Ply-Woods, Chicago, Ill.

SHEETS, CLAD

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Aluminum Co. of America, Pittsburgh, Pa.
American Cladmetals Co., Carnegie, Pa. (Copper clad steel and stainless clad copper)
American Nickeloid Co., Peru, Ill.
Follansbee Steel Corp., Pittsburgh, Pa.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Lukens Steel Co. and Divisions, Coatsville, Pa.

SHEETS, COPPER

American Brass Co., Waterbury, Conn.
American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hussey & Co., C. G., Pittsburgh, Pa.
Inland Steel Products Co., Milwaukee, Wis.
New Haven Copper Co., Seymour, Conn.
●Revere Copper and Brass, Inc., New York, N. Y.
Western Brass Mills, Div. of Olin Industries, Inc., East Alton, Ill. (Brass, bronze, phosphor bronze)

SHEETS, LEAD

Alpha Metals, Inc., Brooklyn, N. Y.
Belmont Smelting & Refining Wks., Inc., Brooklyn, N. Y.
Division Lead Co., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Illinois Zinc Co., Chicago, Ill.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.

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Northwest Lead Co., Seattle, Wash.
Rochester Lead Wks., Rochester, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
Weirton Steel Co., Weirton, W. Va. (Alloy coated)

SHEETS, MAGNESIUM ALLOY

Dow Chemical Co., The, Midland, Mich.

SHEETS, METAL, WITH PROTECTIVE NON-METALLIC COATING

American Nickeloid Co., Peru, Ill.
American Steel Band Co., Pittsburgh, Pa.
Cheney Flashing Co., Trenton, N. J.
Plasteel Products Co., Washington, Pa.
Robertson Co., H. H., Pittsburgh, Pa.
Technical Ply-Woods, Chicago, Ill. (Metal and plywood)

SHEETS, NICKEL AND NICKEL ALLOY

American Nickeloid Co., Peru, Ill.
International Nickel Co., Inc., The, New York, N. Y.
Lukens Steel Co. and Divisions, Coatesville, Pa.
●Revere Copper and Brass Incorporated, New York, N. Y.
Western Brass Mills, Div. of Olin Industries, Inc., East Alton, Ill.

SHEETS, STEEL, COPPER BEARING

Armco Steel Corp., Middletown, O.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., (Sub. United States Steel Corp.), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Follansbee Steel Corp., Pittsburgh, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Lukens Steel Co. and Divisions, Coatesville, Pa.
Newport Steel Corp., Rolling Mill Div., Newport, Ky.
Niles Rolling Mill Co., Niles, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp., Subsidiary, Birmingham, Ala.
United States Steel Co., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS, STEEL, GALVANIZED

Apollo Steel Co., Apollo, Pa.
Armco Steel Corp., Middletown, O.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co. (Sub. United States Steel Corp.), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Empire Sheet & Tin Plate Co., Mansfield, O.
Inland Steel Co., Chicago, Ill.
Newport Steel Corp., Rolling Mill Div., Newport, Ky.
Niles Rolling Mill Co., Niles, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp., Subsidiary, Birmingham, Ala.
United States Steel Co., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wood Steel Co., Alan, Conshohocken, Pa.

SHEETS, STEEL, GALVANNEALED

Berger Mfg. Div., Republic Steel Corp., Canton, O.
Continental Steel Corp., Kokomo, Ind.
Newport Steel Corp., Rolling Mill Div., Newport, Ky.
Niles Rolling Mill Co., Niles, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
United States Steel Co., Pittsburgh, Pa.

SHEETS, STEEL, STAINLESS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Nickeloid Co., Peru, Ill.
Armco Steel Corp., Middletown, O.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
Crucible Steel Co. of America, New York, N. Y.
Duriron Co., Inc., The, Dayton, O.
Eastern Stainless Steel Corp., Baltimore, Md.
Electric Steel Foundry Co., Portland, Ore.
Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
Superior Steel Corp., Pittsburgh, Pa.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp., Subsidiary, Birmingham, Ala.
United States Steel Co., Pittsburgh, Pa.
Universal Cyclops Steel Corp., Bridgeville, Pa.
Washington Steel Corp., Washington, Pa.

SHEETS, WROUGHT IRON

Byers Co., A. M., Pittsburgh, Pa.

SHEETS, ZINC

American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
American Zinc Products Div., Ball Brothers Co., Greencastle, Ind.
Belmont Smelting & Refining Wks., Inc., Brooklyn, N. Y.
Hegeler Zinc Co., Danville, Ill.
Illinois Zinc Co., Chicago, Ill.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Sales Co., New York, N. Y.

SHIELDS, CORROSION, FOR PIPE JOINTS

Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.

SHUTTERS

See Louvers and Shutters

SIGHT GLASSES

See Glasses, Sight, for Pipe Lines

SIGNALS, LIQUID LEVEL

See Alarms, Liquid Level

SIGNALS, TANK FILL

See Alarms, Liquid Level

SLEEVE BEARINGS

See Bearings, Sleeve

SLEEVES, PIPE REPAIR

See Clamps, Pipe Repair

SLIME AND ALGAE CONTROL, WATER TREATMENT FOR

See Treatment, Water, for Slime and Algae Control

SMOKE ALARMS

See Alarms, Smoke

SMOKE ELIMINATORS

See Jets, Overfire Air, for Smoke Abatement

SMOKE GUNS

See Guns and Pots, Smoke and Smudge

SMUDGE POTS

See Guns and Pots, Smoke and Smudge

SOFTENERS, WATER

Alrose Chemical Co., Providence, R. I.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Anderson-Stolz Corp., Kansas City, Mo.
Bogue Electric Co., Paterson, N. J.
Cochrane Corp., Philadelphia, Pa.
Culligan Soft Water Institute, Northbrook, Ill.
Duro Co., Dayton, O.
Elgin Softener Corp., Elgin, Ill.
General Filter Co., Ames, Ia.
Heilman Boiler Wks., Inc., Allentown, Pa.
MacDermid Chemical Co., Bristol, Conn.
Norwood Associated Engineers Inc., Springfield, Mass.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
●Refinite Corp., Omaha, Neb.
●Research Products Corp., Madison, Wis.
Stover Water Softener Co., St. Charles, Ill.
Uniflow Mfg. Co., Erie, Pa.
Warlo Corp., New York, N. Y.

SOLAR HEAT RESISTING SCREENS

See Screens, Sun Reflecting

SOLDER (SILVER), BRAZING ALLOYS, AND FLUXES

Air Reduction Sale Co., New York, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allen Co., Inc., L. B., Chicago, Ill.

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American Brass Co., Waterbury, Conn.
American Platinum Works, Newark, N. J.
Atkins & Co., E. C., Indianapolis, Ind.
Baker & Co., Inc., Newark, N. J.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Division Lead Co., Chicago, Ill.
Eutectic Welding Alloys Corp., New York, N. Y.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Handy & Harman, New York, N. Y.
Hardy, Inc., Charles, New York, N. Y.
Industrial Service Laboratories, Milwaukee, Wis.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Marquette Mfg. Co., Minneapolis, Minn.
● Mueller Brass Co., Port Huron, Mich.
National Cylinder Gas Co., Chicago, Ill.
Powder Weld Process Co., The, Brooklyn, N. Y.
Soldering Specialties Co., Summit, N. J.
Special Chemicals Corp., New York, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Wabash Mfg. Co., Chicago, Ill.

SOLDER (TIN-LEAD), AND FLUXES

Allen Co., Inc., L. B., Chicago, Ill.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Alpha Metals, Inc., Brooklyn, N. Y.
Alsoco Corp., New York, N. Y. (Aluminum solder)
American Brass Co., Waterbury, Conn.
American Solder & Flux Co., Philadelphia, Pa.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
Benson Co., Inc., Alex R., Hudson, N. Y.
Burnley Battery & Mfg. Co., North East, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Division Lead Co., Chicago, Ill.
du Pont de Nemours & Co., E. I., Grasselli Chemicals Dept., Wilmington, Del.
Eagle-Picher Co., Cincinnati, O.
Eutectic Welding Alloys Corp., New York, N. Y.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Galv-Weld Products, Lima, O.
Gardiner Metal Co., Chicago, Ill.
Glaser Lead Co., Inc., Brooklyn, N. Y.
Hercules Chemical Co., Inc., New York, N. Y.
Industrial Service Laboratories, Milwaukee, Wis.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Johnson Foil Mfg. Co., The, St. Louis, Mo.
Kester Solder Co., Chicago, Ill.
Klauer Mfg. Co., Dubuque, Ia.
Lake Chemical Co., Chicago, Ill.
Lenk Mfg. Co., Boston, Mass.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
Merchant & Evans Co., Philadelphia, Pa.
● Mueller Brass Co., Port Huron, Mich.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Paul-Lewis Laboratories, Inc., Milwaukee, Wis.
Powder Weld Process Co., The, Brooklyn, N. Y.
Proved Products Mfg. Co., San Fernando, Calif.
Rochester Lead Works, Inc., Rochester, N. Y.
Rotometals, Inc., San Francisco, Calif.
Ruby Chemical Co., Columbus, O.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Soldering Specialties Co., Summit, N. J.
Special Chemicals Corp., New York, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Utility Laboratory, Inc., Brooklyn, N. Y.
Wolfe-Kote Co., Inc., Sheboygan, Wis.

SOLENOIDS AND SOLENOID COILS

● Allen-Bradley Co., Milwaukee, Wis.
● Automatic Switch Co., Orange, N. J.
Barber-Colman Co., Rockford, Ill.
B/W Controller Corp., Birmingham, Mich.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis & Co., Dean W., Chicago, Ill.
Essex Wire Corp., Ft. Wayne, Ind.
● General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Hubbell Corp., Mundelein, Ill.
Jefferson Electric Co., Bellwood, Ill.
McQuay-Norris Mfg. Co., St. Louis, Mo.
National Acme Co., The, Cleveland, O.
Soreng Mfg. Co., Schiller Park, Ill.
Synchro-Start Products, Inc., Chicago, Ill.
Trombetta Solenoid Corp., Milwaukee, Wis.

SOLENOID VALVES

See Valves, Solenoid

SOOT BLOWERS

See Blowers, Soot

SOOT DESTROYERS

See Destroyers, Soot, Chemical

SOUND CONTROL FOR COOLING TOWERS

See Noise Elimination for Cooling Towers

SOUND DEADENING FOR DUCTS

See Insulation, Duct, Sound Deadening

SOUND INDICATORS

See Indicators, Sound Level

SPARGER NOZZLES

See Nozzles, Sparger, for Tank Heating

SPEED CHANGERS

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical

SPEED REDUCERS

See Reducers, Speed

SPIRAL PIPE

See Pipe, Spiral, Riveted and Welded

SPOT WELDERS

See Welders, Spot

SPRAY HUMIDIFIERS

See Humidifiers, Direct, Spray Head

SPRAY NOZZLES

See Nozzles, Spray

SPRAY PAINTING BOOTHS

See Booths, Painting, Spray

SPRINKLER HEADS

See Heads, Sprinkler

SPRINKLER SYSTEM CONTROLS

See Controls, Fire Protection Sprinkler System; Valves, Fire Protection Sprinkler System Control

STACKS AND CHIMNEYS, INDUSTRIAL, PREFABRICATED

Industrial Van-Packer Corp., Chicago, Ill.

STAINLESS STEEL PIPE

See Pipe, Steel, Stainless

STAINLESS STEEL SHEETS

See Sheets, Steel, Stainless

STANDS, PIPE VISE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Martin & Sons, H. P., Owensboro, Ky.
Nye Tool Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
● Ridge Tool Co., Elyria, O.
Western Wire Products Co., St. Louis, Mo.
Williams & Co., J. H., Buffalo, N. Y.

STAPLES FOR FASTENING TUBING

See Hangers and Supports, Pipe

STARTERS, MOTOR

See Controllers and Starters, Motor

STEAM BOOSTER COMPRESSORS

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STEAM ENGINES

See Engines, Steam

STEAM GENERATORS

See Boilers

STEAM JET HEATERS

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STEAM JET REFRIGERATION

See Compressors, Refrigerating, Steam Jet

STEAM PRESSURE REGULATORS

See Valves, Pressure Reducing and Regulating

STEAM PUMPS

See Pumps, Steam

STEAM SEPARATORS

See Separators, Steam and Oil

STEAM TRAPS

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STEEL PIPE

See Pipe, Steel

STEEL TUBE FITTINGS, FLARED

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STEEL TUBING

See Tubing, Steel

STEEL UNIONS

See Unions, Steel

STEEL VALVES

See Valves, Gate; and Valves, Globe

STERILIZING LAMPS

See Lamps, Sterilizing, for Duct Installation

STERILIZING UNITS

See Units, Sterilizing, Air

STOCKS AND DIES

American Pipe Tool Co., Chicago, Ill.
Armstrong Mfg. Co., Bridgeport, Conn.
Beaver Pipe Tools, Inc., Warren, O.
Capewell Mfg. Co., Hartford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Crown Die & Tool Co., Chicago, Ill. (Pipe)
Erie Tool Wks., Erie, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hollands Mfg. Co., Erie, Pa.
Nye Tool Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
●Ridge Tool Co., Elyria, O.
Saunders Mfg. Co., Yonkers, N. Y.
Threadwell Tap & Die Co., Greenfield, Mass.
Toledo Pipe Threading Machine Co., Toledo, O.

STOKERS, INDUSTRIAL AND COMMERCIAL

61 *to* 1200 *Lb per Hr*

Allington & Curtis Mfg. Co., Saginaw, Mich. (For shavings, chips and sawdust)
American Coal Burner Co., Chicago, Ill.
American Engineering Co., Philadelphia, Pa.
Auburn Burner Co., Auburn, Ind.
Auburn Foundry, Inc., Stoker Div., Auburn, Ind.
Automatic Firing Corp., St. Louis, Mo.
●Babcock & Wilcox Co., New York, N. Y.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Canton Stoker Corp., Canton, O.
Carnes, Inc., John R., Lima, O.
Carpenter Heating & Stoker Co., Cleveland, O.
Central Rubber & Steel Corp., Findlay, O.
Clizbe Bros. Mfg. Co., Plymouth, Ind.
Combustion Engineering-Superheater, Inc., New York, N. Y.
●Detroit Stoker Co., Detroit, Mich.
Diamond Iron Works, Inc., Minneapolis, Minn.
Econocol Stoker Div. of Cotta Transmission Co., Rockford, Ill.
Eddy Stoker Corp., Chicago, Ill.
Erie City Iron Works, Erie, Pa.
Fire-King Stoker Co., Indianapolis, Ind.
Flynn & Emrich Co., Baltimore, Md.
Frederick Iron & Steel Inc., Frederick, Md.
Freeman Stoker Div., Illinois Iron & Bolt Co., Chicago, Ill.
Fuel Savers, Inc., Harrisburg, Pa.
General Machinery Co., Spokane, Wash.
Gross-Aire Mfg. Co., Overland, Mo.
Gunnite Foundries Corp., Rockford, Ill. (Screws)
Heating Assurance, Inc., Spokane, Wash.
Her-Born Engrg. & Mfg. Co., Sandusky, O.
Hershey Machine & Foundry Co., Motorstokor Div., Manheim, Pa.
Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
International Engineering Wks., Inc., Framingham, Mass.
●Iron Fireman Mfg. Co., Cleveland, O.
Johnston & Jennings Co., Cleveland, O.
Kingston Products Corp., Kokomo, Ind.
Kol-Master Corp., Oregon, Ill.
Laclede Stoker Co., St. Louis, Mo.
Leffel & Co., James, Springfield, O.
Loyal Knight Stokers, Inc., Belleville, Ill.
Mallory Sales Co., Dolton, Ill.
Meyer Furnace Co., The, Peoria, Ill.
Muncie Gear Wks., Inc., Muncie, Ind.
National Steam Pump Co., Upper Sandusky, O.
Newcomb-Detroit Co., Detroit, Mich.
Northern Steel & Stoker Corp., Peoria, Ill.
Ormsby-Osterman, Inc., St. Louis, Mo.
OverSpred Stoker Co., Chicago, Ill.
Perfection Grate & Stoker Co., Springfield, Mass.
Plymouth Industries, Inc., Plymouth, Ind.
Read Standard Corp., Blower-Stoker Div., Erie, Pa.
Rheem Mfg. Co., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Sinker-Davis Co., Indianapolis, Ind.
Steel Products Engineering Co., Springfield, O.
Sun-Fire Stoker Corp., New Albany, Ind.
Timken Silent Automatic Div., Timken-Detroit Axle Co., Jackson, Mich.
U. S. Machine Corp., Lebanon, Ind.
V. & E. Products, Inc., Schuylkill Haven, Pa.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whiting Fire Power Products Corp., Superior, Wis.
Whitty Co., Inc., Boston, Mass. (Bituminous)
Will-Burt Co., The, Orrville, O.

STONEWARE PIPE

See Pipe, Stoneware

STORAGE WATER HEATERS

See Heaters, Water, Steam, Storage

STRAINERS, PIPE LINE

Air Maze Corp., Cleveland, O.
●Alco Valve Co., St. Louis, Mo.
American District Steam Co., North Tonawanda, N. Y.
Aminco Refrigeration Products Co., Detroit, Mich.
Andale Co., Philadelphia, Pa.
●Anderson Co., V. D., The, Cleveland, O.
●Armstrong Machine Wks., Three Rivers, Mich.
●Barnes & Jones, Inc., Boston, Mass. (steam and water only)
Barrett, Haentjens & Co., Hazleton, Pa.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blackmer Pump Co., Grand Rapids, Mich.
Bowser, Inc., Fort Wayne, Ind.
Boylston Steam Specialty Co., Chicago, Ill.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Cashin Co., W. D., Boston, Mass.
Cee-Kleer Products Co., Cincinnati, O.
Clark Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Cuno Engineering Corp., Meriden, Conn.
Davis Regulator Co., Chicago, Ill.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Edward Valves, Inc., East Chicago, Ind.
Elliott Co., Jeannette, Pa.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Foster Pump Works, Inc., Union, N. Y.
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hays Mfg. Co., Erie, Pa.
●Henry Valve Co., Melrose Park, Ill.
●Hoffman Specialty Co., Indianapolis, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Kieley & Mueller, Inc., North Bergen, N. J.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
●Leslie Co., Lyndhurst, N. J.
Madden Brass Products Co., The, Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marsh Heating Equipment Co., Jas. P., Skokie, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
●Mueller Brass Co., Port Huron, Mich.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Long Island City, N. Y.
Newark Wire Cloth Co., Newark, N. J.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
OPW Corp., Cincinnati, O.
Phillips & Co., H. A., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
R-S Products Corp., Philadelphia, Pa.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.

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●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Scientific Instrument Co., Detroit, Mich.
Sheffler-Gross Co., Philadelphia, Pa.
●Spence Engineering Co., Inc., Walden, N. Y.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Standard Machine & Mfg. Co., St. Louis, Mo.
Staples & Pfeiffer, San Francisco, Calif.
●Sterling, Inc., Milwaukee, Wis.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Trimount Rotary Power Co., Dedham, Mass.
Tryco Products, Inc., Westfield, Mass.
●Walworth Co., New York, N. Y.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
●Webster & Co., Warren, Camden, N. J.
Webster Electric Co., Racine, Wis. (For oil burners)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Winslow Engineering Co., Oakland, Calif.
Wright-Austin Co., Detroit, Mich.
●Yarnall-Waring Co., Philadelphia, Pa.
Zurn Mfg. Co., J. A., Industrial Div., Erie, Pa.

STRESS RELIEVERS

See Preheaters and Stress Relievers, Electric, for Pipe Welds

STRIP HEATERS

See Heaters, Strip and Immersion, Electric

STRUCTURAL SHAPES

See Angles, Bars, Beams, Channels and Tees

STUD DRIVERS

See Drills, Powder Operated

STUD WELDERS

See Welders, Stud

SUCTION LINE HEAT EXCHANGERS

See Exchangers, Heat, Refrigerant Suction Line

SUMP PUMPS

See Pumps, Sump

SUPERHEATERS, PROCESS STEAM

●Babcock & Wilcox Co., New York, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Edge Moor Iron Works, Inc., Edge Moor, Del.
Ewing Mfg. Co., Oklahoma City, Okla.
●Foster Wheeler Corp., New York, N. Y.
Goodyer Industries, Inc., Chicago, Ill.
Selas Corp. of America, Philadelphia, Pa.
Springfield Boiler Co., Springfield, Ill.
Wiegand Co., Edwin L., Pittsburgh, Pa.

SURFACE, FINNED, COOLING, BRINE

●Acme Industries, Inc., Jackson, Mich.
●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co. The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Conditionaire Unit Co., Chicago, Ill.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
●G. & O. Mfg. Co., New Haven, Conn.
Griscom-Russell Co., The, New York, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
Murray Mfg. Co., D. J., Wausau, Wis.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
●Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Vilter Mfg. Co., Milwaukee, Wis.
●Wolverine Tube Div. Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE, FINNED, COOLING, COLD WATER

●Acme Industries, Inc., Jackson, Mich.
●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Conditionaire Unit Co., Chicago, Ill.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
●G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
●Governair Corp., Oklahoma City, Okla.
Griscom-Russell Co., The, New York, N. Y.
Hastings Air Conditioning Co., Hastings, Neb.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
●Nesbitt, Inc., John J., Philadelphia, Pa.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Pleasantaire Corp., Washington, D. C.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
●Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.
●Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit, Mich.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE, FINNED, COOLING, DIRECT EXPANSION

●Acme Industries, Inc., Jackson, Mich.
●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
Betz Corp., Hammond, Ind.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Conditionaire Unit Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
●G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
●Governair Corp., Oklahoma City, Okla.
Griscom-Russell Co., The, New York, N. Y.
Hastings Air Conditioning Co., Hastings, Neb.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Howe Ice Machine Co., Chicago, Ill.

● Advertisement in this issue. See Index to Advertisers, page 128d

Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
Merchant & Evans Co., Philadelphia, Pa.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Pleasantaire Corp., Washington, D. C.
Refrigeration Appliances Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
●Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE, FINNED, HEATING, INDIRECT, FERROUS

●Bayley Blower Co., Milwaukee, Wis.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Conditionaire Unit Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Drayer & Hanson, Inc., Los Angeles, Calif.
●G. & O. Mfg. Co., New Haven, Conn.
Goodyer Industries, Inc., Chicago, Ill.
Griscom-Russell Co., The, New York, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●New York Blower Co., Chicago, Ill.
●Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Rigidbilt Inc., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
●Vulcan Radiator Co., Hartford, Conn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

SURFACE, FINNED, HEATING, INDIRECT, NON-FERROUS

●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
●Bayley Blower Co., Milwaukee, Wis.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
●G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Goodyer Industries, Inc., Chicago, Ill.
●Governair Corp., Oklahoma City, Okla.
Griscom-Russell Co., The, New York, N. Y.
Hastings Air Conditioning Co., Hastings, Neb.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
●Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
●Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Vulcan Radiator Co., Hartford, Conn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE THERMOSTATS

See Thermostats, Surface

SWING JOINTS

See Joints, Pipe, Flexible Swing and Revolving

SWITCHES, ELECTRICAL

Acro Mfg. Co., The, Columbus, O.
Adam Electric Co., Frank, St. Louis, Mo.
Aerotec Corp., The, Greenwich, Conn.
●Allen-Bradley Co., Milwaukee, Wis.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
●Automatic Switch Co., Orange, N. J.
Barber-Colman Co., Rockford, Ill.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Clark Controller Co., Cleveland, O.
Congress Fan & Electric Co., Daytona Beach, Fla.
Cooper Co., Clark, Palmyra, N. J.
Crise Mfg. Co., The, Columbus, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Delta-Star Electric Co., Div. of H. K. Porter Co., Inc., Chicago, Ill.
Electric Controller & Mfg. Co., Cleveland, O.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro-Switch & Controls, Inc., Culver City, Calif.
Furnas Electric Co., Batavia, Ill.
●General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Hart Mfg. Co., Hartford, Conn.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., Chicago, Ill.
Micro Switch Div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monitor Controller Co., The, Boston, Mass.
Morse-Smith-Morse, Inc., Watertown, Mass.
National Acme Co., The, Cleveland, O.
●Penn Controls, Inc., Goshen, Ind.
Pyle-National Co., The, Chicago, Ill.
Soreng Mfg. Co., Schiller Park, Ill.
Square D Co., Detroit, Mich.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Struthers-Dunn, Inc., Philadelphia, Pa.
Thermix Corp., The, Greenwich, Conn.
Tork Clock Co., Inc., Mount Vernon, N. Y.
Trumbull Dept., General Electric Co., Plainville, Conn.
Unimax Switch Div., W. L. Maxson Corp., New York, N. Y.
●Ward Leonard Electric Co., Mount Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.
White Mfg. Co., St. Paul, Minn.
White-Rodgers Electric Co., St. Louis, Mo.
Zenith Electric Co., Chicago, Ill.

SWITCHES, FLOAT, REFRIGERATION

●Alco Valve Co., St. Louis, Mo.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Clark Controller Co., Cleveland, O.
●Frick Co., Waynesboro, Pa.
Magnetrol, Inc., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.

SWITCHES, FLOW

Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Drying Systems, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
●General Controls Co., Glendale, Calif.

Magnetrol, Inc., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Penn Controls, Inc., Goshen, Ind.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.

SWITCHES, LIQUID LEVEL

Acro Mfg. Co., The, Columbus, O.
●Alco Valve Co., St. Louis, Mo.
●Allen-Bradley Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Automatic Control Co., St. Paul, Minn.
B/W Controller Corp., Birmingham, Mich.
Bennett Oil Co., Omaha, Neb.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Lubricator Co., Detroit, Mich.
Fielden Instrument Corp., Philadelphia, Pa.
Fischer & Porter Co., Hatboro, Pa.
Furnas Electric Co., Batavia, Ill.
●General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Healy Ruff Co., St. Paul, Minn.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Magnetrol Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monitor Controller Co., The, Boston, Mass.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
●Penn Controls, Inc., Goshen, Ind.
Photoswitch, Inc., Cambridge, Mass.
Ripley Co., Inc., Middletown, Conn.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Thermix Corp., The, Greenwich, Conn.
Westinghouse Electric Corp., Pittsburgh, Pa.

SWITCHES, MERCURY

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Durakool, Inc., Elkhart, Ind.
General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
●Mercoid Corp., Chicago, Ill.
Mercontrol Inc., New York, N. Y.
Micro Switch, Div. of Minneapolis Honeywell Reg. Co., Freeport, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Norwalk Valve Co., South Norwalk, Conn.
Potter & Brumfield Sales Co., Princeton, Ind.
Westinghouse Electric Corp., Pittsburgh, Pa.

SWITCHES, PRESSURE AND VACUUM

Aerotec Corp., The, Greenwich, Conn.
●Allen-Bradley Co., Milwaukee, Wis.
Autempco Corp., New York, N. Y.
Automatic Control Co., St. Paul, Minn.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
Clark Controller Co., Cleveland, O.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Lubricator Co., Detroit, Mich.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Furnas Electric Co., Batavia, Ill.
●General Controls Corp., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Healy Ruff Co., St. Paul, Minn.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
McQuay-Norris Mfg. Co., St. Louis, Mo.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monitor Controller Co., The, Boston, Mass.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Ranco, Inc., Columbus, O.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Sampsel Time Control, Inc., Spring Valley, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
Soreng Mfg. Co., Schiller Park, Ill.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Westinghouse Electric Corp., Pittsburgh, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.

SWITCHES, TIME

●Allen-Bradley Co., Milwaukee, Wis.
American Gas Accumulator Co., Elizabeth, N. J.
Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Western Springs, Ill.
Automatic Electric Mfg. Co., Mankato, Minn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Cooper Co., Clark, Palmyra, N. J.
Durakool, Inc., Elkhart, Ind.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Electric Switch & Controls, Inc., Culver City, Calif.
●General Controls Corp., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gleason-Avery, Inc., Auburn, N. Y.
Hansen Mfg. Co., Princeton, Ind. (timing motors and time machine)
Haydon Mfg. Co., Inc., Sub. General Time Instruments Corp., Torrington, Conn.
Heat Timer Corp., New York, N. Y.
Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
International Register Co., Chicago, Ill.
Landis & Gyr, Inc., New York, N. Y.
●Mercoid Corp., Chicago, Ill.
Miller-Harris Instrument Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
National Time & Signal Corp., Detroit, Mich.
Paragon Electric Co., Two Rivers, Wis.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Photoswitch, Inc., Cambridge, Mass.
Potter & Brumfield Sales Co., Princeton, Ind.
Precision Products, Inc., Tulsa, Okla.
Reliance Automatic Lighting Co., Racine, Wis.
Reynolds Electric Co., River Grove, Ill.
Rhodes, Inc., M. H., Hartford, Conn.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
Sampsel Time Control, Inc., Spring Valley, Ill.
Sangamo Electric Co., Springfield, Ill.
Telechron, Inc., Ashland, Mass.
Tork Clock Co., Inc., Mount Vernon, N. Y.
●Ward Leonard Electric Co., Mount Vernon, N. Y.
●Webster & Co., Warren, Camden, N. J.
Westinghouse Electric Corp., Pittsburgh, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.
Zenith Electric Co., Chicago, Ill.

SWIVEL PIPE COUPLINGS

See Joints, Pipe, Flexible Swing and Revolving

SYSTEMS, COMBUSTION CONTROL

Askania Regulator Co., Chicago, Ill.
●Aurora Pump Co., Aurora, Ill.
Bailey Meter Co., Cleveland, O.
Bowser, Inc., Fort Wayne, Ind.
Bristol Co., Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
●Combustion Control Corp., Cambridge, Mass.
Defender Instrument & Regulator Co., St. Louis, Mo.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Engineer Co., New York, N. Y.
Ess Instrument Co., Bergenfield, N. J.
Fischer & Porter Co., Hatboro, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
General Power Plant Corp., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
Hays Corp., Michigan City, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Iron Fireman Mfg. Co., Cleveland, O.
Leahy Mfg. Co., Los Angeles, Calif.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
Republic Flow Meters Co., Chicago, Ill.
Selas Corp. of America, Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.

SYSTEMS, CONDENSATE RETURN

Acker Organization, Inc., W. M., Cleveland, O.
●Aurora Pump Co., Aurora, Ill.

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●Barnes & Jones, Inc., Boston, Mass.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Dunham Co., C. A., Chicago, Ill.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
Johnson Corp., The, Three Rivers, Mich.
●Orr & Sembower, Inc., Reading, Pa.
Roth Co., Roy E., Rock Island, Ill.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Templeton Bros., Hyde Park, Mass.

SYSTEMS, ELECTRIC PIPE HEATING

●Fluid Systems, Inc., New Haven, Conn.
Industrial Engineering & Equipment Co., St. Louis, Mo.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

SYSTEMS, FIRE EXTINGUISHING, AND HEAT AND SMOKE DETECTORS

●C-O-Two Fire Equipment Co., Newark, N. J.
Cardox Corp., Chicago, Ill.
Edison, Inc., Thomas A., West Orange, N. J.
●Grinnell Co., Inc., Providence, R. I.

SYSTEMS, HEATING, HIGH TEMPERATURE HOT WATER

Over 350 F

American Hydrotherm Corp., Long Island City, N. Y.
International Boiler Works, The, East Stroudsburg, Pa.
Ross Engineering Corp., J. O., New York, N. Y.

SYSTEMS, HEATING, HOT WATER

Baseline Mfg. Co., Minneapolis, Minn.
●Bell & Gossett Co., Morton Grove, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
General Heaters & Regulators Co., Chicago, Ill.
Gold Top Heating, Inc., Butte, Mont.
●Hoffman Specialty Co., Indianapolis, Ind.
Hook & Ackerman, Inc., New York, N. Y.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Surface Combustion Corp., Toledo, O.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A. Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Speciality Co., Inc., Peru, Ind.
●Webster & Co., Warren, Camden, N. J.

SYSTEMS, HEATING, VACUUM

Anderson Products, Inc., Cambridge, Mass.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Dunham Co., C. A., Chicago, Ill.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Marsh Heating Equipment Co., Skokie, Ill.
Monash-Younker Co., Inc., Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Trane Co., The, La Crosse, Wis.
●Webster & Co., Warren, Camden, N. J.
Whittington Pump & Engineering Corp., Indianapolis, Ind.

SYSTEMS, HEATING, VAPOR

American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Marsh Heating Equipment Co., Skokie, Ill.
Monash-Younker Co., Inc., Chicago, Ill.
Radiator Valve Co. of America, Philadelphia, Pa.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.

SYSTEMS, HEATING, ZONE CONTROL

Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Western Springs, Ill.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
●Barnes & Jones, Inc., Boston, Mass.
●Bell & Gossett Co., Morton Grove, Ill.
●Dunham Co., C. A., Chicago, Ill.
General Heaters & Regulators Co., Chicago, Ill.
Gold Top Heating, Inc., Butte, Mont.
Heat Timer Corp., New York, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Skokie, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
●Webster & Co., Warren, Camden, N. J.
Wheelco Instruments Co., Chicago, Ill.
Zone-Heat Regulator Co., Garrettsville, O.

SYSTEMS, HOT GAS DEFROSTING, FOR REFRIGERATION

●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Penn Controls, Inc., Goshen, Ind.
Tenney Engineering, Inc., Newark, N. J.

SYSTEMS, PROCESS HEATING, HIGH TEMPERATURE

●Air Devices, Inc., New York, N. Y.
American Hydrotherm Corp., Long Island City, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Dow Chemical Co., The, Midland, Mich.
●Dravo Corp., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Goodyer Industries, Inc., Chicago, Ill.
●Illinois Engineering Co., Chicago, Ill.
International Boiler Works, The, East Stroudsburg, Pa.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
●Olson & Co., Arthur A., Canfield, O.
Parks-Cramer Co., Fitchburg, Mass.
Peabody Engineering Corp., New York, N. Y.
Ross Engineering Corp., J. O., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Selas Corp. of America, Philadelphia, Pa.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
●Struthers Wells Corp., Titusville, Pa.
●Trane Co., The, La Crosse, Wis.
Trent, Inc., Philadelphia, Pa.
●Wing Mfg. Co., L. J., Linden, N. J.

SYSTEMS, ROOF SPRAYING (FOR COOLING ROOFS)

●April Showers Co., Inc., Washington, D. C.
●Binks Mfg. Co., Chicago, Ill.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
●Marley Co., Inc., The, Kansas City, Kan.
Rockwood Spinkler Co., Worcester, Mass.
Ross Sprinkler Co., Pasadena, Calif.
●Ruppright, Siegfried, Los Angeles, Calif.
Skinner Irrigation Co., Troy, O.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co, Bellwood, Ill.
Thermal Industries, San Francisco, Calif.
Water Cooling Corp., New York, N. Y.

TAGS, VALVE, FOR IDENTIFYING VALVES

Meyer & Wenthe, Inc., Chicago, Ill.

TANK HEADS

See Parts, for Heating and Air Conditioning Equipment

TANKS, BLOWOFF

Buffalo Tank Corp., Newark, N. J.
Downingtown Iron Works, Downingtown, Pa.
Koven & Bro., L. O., Inc., Jersey City, N. J.
Manitowoc Engineering Works, Manitowoc, Wis.
Murray Iron Wks. Co., Burlington, Ia.
Richmond Engineering Co., Inc., Richmond, Va.
Wright-Austin Co., Detroit, Mich.

TANKS, EXPANSION, FOR HOT WATER HEATING SYSTEMS

Baseline Mfg. Co., Minneapolis, Minn.
●Bell & Gossett Co., Morton Grove, Ill.
Biggs Boiler Works Co., E. Akron, O.
Birchfield Boiler, Inc., Tacoma, Wash.

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Buffalo Tank Corp., Newark, N. J.
Caldwell Co., W. E., Louisville, Ky.
Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Kehm Corp., The, Chicago, Ill.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Maysteel Products, Inc., Milwaukee, Wis.
Quaker City Iron Wks., Philadelphia, Pa.
Rheem Mfg. Co., New York, N. Y.
Scaife Co., Oakmont, Pa.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Wood Co., John, Conshohocken, Pa.
Wright-Austin Co., Detroit, Mich.

TANKS, PROCESS AND STORAGE

Aeroil Products Co., Inc., South Hackensack, N. J.
Alert Boiler & Mfg. Co., Detroit, Mich.
Aluminum Co. of America, Pittsburgh, Pa.
American Car & Foundry Co., New York, N. Y.
American Hard Rubber Co., New York, N. Y. (Rubber lined)
American Moistening Co., Providence, R. I.
American Shipbuilding Co., Cleveland, O.
Armco Drainage & Metal Products, Inc., Middletown, O.
●Bell & Gossett Co., Morton Grove, Ill.
Bigelow Co., New Haven, Conn.
Biggs Boiler Wks. Co., E. Akron, O.
Birchfield Boiler, Inc., Tacoma, Wash.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Buffalo Tank Corp., Newark, N. J.
Caldwell Co., W. E., Louisville, Ky.
Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Chicago Bridge & Iron Co., Chicago, Ill.
Chicago Steel Tank Co., Chicago, Ill.
Cincinnati Metalcrafts Inc., Cincinnati, O.
Columbian Steel Tank Co., Kansas City, Mo.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Connery Construction Co., Philadelphia, Pa.
Dahlquist Mfg. Co., Div. of Process Engineering Inc., Somerville, Mass.
Day Co., The, Minneapolis, Minn.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Dillon Steam Boiler Wks., Inc., D. M., Fitchburg, Mass.
Downingtown Iron Works, Downingtown, Pa.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Elastic Porcelain Lining Corp., Rochester, N. Y. (Tank linings)
Falstrom Co., Passaic, N. J.
Farrar & Trefts, Buffalo, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
Gehri Co., Tacoma, Wash.
General Ceramics & Steatite Corp., Keasbey, N. J. (chemical stoneware & porcelain)
Gerstein & Cooper, Inc., South Boston, Mass.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Goodrich Co., B. F., Akron, O. (Rubber lined)
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Haveg Corp., Newark, Del.
Heilman Boiler Wks., Inc., Allentown, Pa.
Hodge Boiler Works, East Boston, Mass.
International Boiler Wks., The, East Stroudsburg, Pa.
Kirk & Blum Mfg. Co., Cincinnati, O.
Knight, Maurice A., Akron, O.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Lead Lined Iron Pipe Co., Wakefield, Mass.
Littleford Bros. Inc., Cincinnati, O.
Lumm Co., A. H., Toledo, O.
Manitowoc Engineering Wks., Manitowoc, Wis.
Maysteel Products, Inc., Milwaukee, Wis.
Mesker Steel Corp., Geo. L., Evansville, Ind.
Murray Iron Wks. Co., Burlington, Ia.
National Metal Fabricators, Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Nooter Corp., St. Louis, Mo.
Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa. (glass)
Quaker City Iron Wks., Philadelphia, Pa.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Rosebraugh Co., W. W., Salem, Ore.
Roth Co., Roy E., Rock Island, Ill.
Santa Fe Tank & Tower Co., Los Angeles, Calif.
Scaife Co., Oakmont, Pa.
Sims Co., Erie, Pa.
Southbridge Roofing Co., Inc., Southbridge, Mass.
●Struthers Wells Corp., Titusville, Pa.
●Terre Haute Boiler Works Co., Terre Haute, Ind.
Tippett & Wood, Phillipsburg, N. J.
Trageser Copper Wks., Inc., Maspeth, Long Island, N. Y.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Walsh-Holyoke Steam Boiler Co., Holyoke, Mass.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Wood Co., John, Conshohocken, Pa.

TAPE, INDUSTRIAL, ADHESIVE

Firestone Industrial Products Co., Akron, O.
Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Irvington Varnish & Insulator Co., Irvington, N. J.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Johns-Manville, New York, N. Y.
Polyken Industrial Tape Dept., Bauer & Black, Div. of the Kendall Co., Chicago, Ill.
Products Research Co., Glendale, Calif.
Seamless Rubber Co., Industrial Tape Div., New Haven, Conn.
United States Rubber Co., New York, N. Y.

TAPS, PIPE

Continental Screw Co., New Bedford, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
Threadwell Tap & Die Co., Greenfield, Mass.

TEMPERATURE AND HUMIDITY CONTROLS

See Humidistats; Recorder-Controllers; Thermostats

TEMPERATURE RECORDERS

See Recorders, Temperature

TEMPERATURE REGULATORS

See Regulators, Temperature

TEMPLATES, DRAWING, PIPING

Dietzgen Co., Eugene, Chicago, Ill.

TEST CHAMBERS

See Chambers, Test, Controlled Temperature and Humidity

TESTERS, GAGE, DEAD WEIGHT

Ashton Valve Co., Cambridge, Mass.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Dillon Co., Inc., W. C., Forest Park, Ill.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Mansfield & Green, Cleveland, O.

TESTERS, LEAK, FOR PIPING AND VESSELS

Greer Hydraulics, Inc., Brooklyn, N. Y.

THERMOMETERS, INDICATING, INDUSTRIAL

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dillon Co., Inc., W. C., Forest Park, Ill.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Equipoise Controls, Mount Vernon, N. Y.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
Garden City Instruments, Inc., Chicago, Ill.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon & Co., Chicago, Ill.
●Illinois Testing Laboratories, Inc., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Pacific Transducer Co., Los Angeles, Calif. (for surface temperatures)
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.
Wheelco Instruments Co., Chicago, Ill.

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THERMOMETERS, INDICATING, REMOTE-READING

Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Defender Instrument & Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Fee & Stemwedel, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Illinois Testing Laboratories, Inc., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Moore Products Co., Philadelphia, Pa.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Rochester Mfg. Co., Rochester, N. Y.
●Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thompson Research & Mfg. Co., Davenport, Fla.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Themometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.

THERMOMETERS, INDICATING, WALL

Bristol Co., The, Waterbury, Conn.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Fee & Stemwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hausman Mfg. & Sales Co., Chicago, Ill. (Indicates both temperature and humidity, showing comfort zone)
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Skokie, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Philadelphia Thermometer Co., Philadelphia, Pa.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
●Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y. (Effective temperature indicator)
Weston Electrical Instrument Corp., Newark, N. J.
Wheelco Instruments Co., Chicago, Ill.

THERMOMETERS, KATA

G. M. Mfg. Co., New York, N. Y.
Hill, E. Vernon & Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.

THERMOSTATIC BELLOWS

See Bellows, Thermostatic and Metallic

THERMOSTATIC BI-METALS

See Bi-Metals, Thermostatic

THERMOSTATIC TRAPS

See Traps, Steam, Thermostatic

THERMOSTATS, DUCT TYPE

American District Telegraph Co., New York, N. Y.
Atlas Valve Co., Newark, N. J.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., South Orange, N. J.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Cooper Co., Clark, Palmyra, N. J.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Fenwal, Inc., Ashland, Mass.
●Johnson Service Co., Milwaukee, Wis.
●Leslie Co., Lyndhurst, N. J.
●Mechanical Industries Production Co., Akron, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Moeller Instrument Co., Richmond Hill, N. Y.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Stevens Mfg. Co., Inc., Mansfield, O.
Tallmadge, Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Thermac Co., Los Angeles, Calif.
●United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
●Wiegand Co., Edwin L., Pittsburgh, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, EFFECTIVE TEMPERATURE

Barber-Colman Co., Rockford, Ill.
Cooper Co., Clark, Palmyra, N. J.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
●Sarcotherm Controls, Inc., New York, N. Y.

THERMOSTATS, IMMERSION

●Armstrong Machine Wks., Three Rivers, Mich.
Atlas Valve Co., Newark, N. J.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., South Orange, N. J.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Cooper Co., Clark, Palmyra, N. J.
Detroit Lubricator Co., Detroit, Mich.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Fenwal, Inc., Ashland, Mass.
●General Controls Co., Glendale, Calif.
H-B Instrument Co., Philadelphia, Pa.
Hart Mfg. Co., Hartford, Conn.
Industrial Engineering Corp., Terre Haute, Ind.
●Iron Fireman Mfg. Co., Cleveland, O.
●Johnson Service Co., Milwaukee, Wis.
●Leslie Co., Lyndhurst, N. J.
●Mechanical Industries Production Co., Akron, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Smith Control & Instrument Corp., Palmyra, N. J.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Thermac Co., Los Angeles, Calif.
Thwing-Albert Instrument Co., Philadelphia, Pa.
●United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
Vulcan Electric Co., Danvers, Mass.
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.
●Wiegand Co., Edwin L., Pittsburgh, Pa.
Wilcolator Co., Elizabeth, N. J.

THERMOSTATS, RADIANT HEAT

Detroit Lubricator Co., Detroit, Mich.
●General Controls Co., Glendale, Calif.
Iron Fireman Mfg. Co., Cleveland, O.
●Mercoid Corp., The, Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Thrush & Co., H. A., Peru, Ind.
●White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, ROOM OR WALL

A-P Controls Corp., Milwaukee, Wis.

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Acro Mfg. Co., The, Columbus, O.
● Armstrong Machine Wks., Three Rivers, Mich.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Crown Controls Co., Inc., New Bremen, O.
Detroit Lubricator Co., Detroit, Mich.
● General Controls Co., Glendale, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
● Hoffman Specialty Co., Indianapolis, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
● Iron Fireman Mfg. Co., Cleveland, O.
● Johnson Service Co., Milwaukee, Wis.
McCorkle Co., D. H., Berkeley, Calif.
● Mercoid Corp., The, Chicago, Ill.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
● Penn Controls, Inc., Goshen, Ind.
● Perfex Corp., Milwaukee, Wis.
● Powers Regulator Co., Skokie, Ill.
Roberson Co., L. N., Seattle, Wash.
Sampsel Time Control, Inc., Spring Valley, Ill.
● Sarco Co., Inc., New York, N. Y.
● Sarcotherm Controls, Inc., New York, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
● Thrush & Co., H. A., Peru, Ind.
Triplex Heating Specialty Co., Inc., Peru, Ind.
● United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.
● White-Rodgers Electric Co., St. Louis, Mo.
● Wiegand Co., Edwin L., Pittsburgh, Pa.

THERMOSTATS, SURFACE

Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Cooper Co., Clark, Palmyra, N. J.
Detroit Lubricator Co., Detroit, Mich.
Fenwal, Inc., Ashland, Mass.
● General Controls Co., Glendale, Calif.
Hart Mfg. Co., Hartford, Conn.
● Hoffman Specialty Co., Indianapolis, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
McCorkle Co., D. H., Berkeley, Calif.
● Mechanical Industries Production Co., Akron, O.
● Mercoid Corp., The, Chicago, Ill.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
● Penn Controls, Inc., Goshen, Ind.
● Perfex Corp., Milwaukee, Wis.
● Powers Regulator Co., Skokie, Ill.
Red Spot Electric Co., Tacoma, Wash.
● Sarco Co., Inc., New York, N. Y.
● Sarcotherm Controls, Inc., New York, N. Y.
Smith Control & Instrument Corp., Palmyra, N. J.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Stevens Mfg. Co., Inc., Mansfield, O.
Therm-O-Disc, Inc., Mansfield, O.
Triplex Heating Specialty Co., Inc., Peru, Ind.
● United Electric Controls Co., Watertown, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa
White Mfg. Co., St. Paul, Minn.
● White-Rodgers Electric Co., St. Louis, Mo.
● Wiegand Co., Edwin L., Pittsburgh, Pa.

THERMOSTATS, TWO TEMPERATURE OR DUAL

Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Western Springs, Ill.
● Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., South Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
● General Controls Co., Glendale, Calif.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
● Illinois Engineering Co., Chicago, Ill.
Industrial Engineering Corp., Terre Haute, Ind.
● Johnson Service Co., Milwaukee, Wis.
● Mercoid Corp., The, Chicago, Ill.
Miller-Harris Instrument Co., Milwaukee, Wis.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
● Perfex Corp., Milwaukee, Wis.
● Powers Regulator Co., Skokie, Ill.
Ranco, Inc., Columbus, O.
Sarco Co., Inc., New York, N. Y.
● Sarcotherm Controls, Inc., New York, N. Y.
Sampsel Time Control, Inc., Spring Valley, Ill.
● United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
● White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, WEATHER COMPENSATING

Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Western Springs, Ill.
Barber-Colman Co., Rockford, Ill.
Crown Controls Co., Inc., New Bremen, O.
Detroit Lubricator Co., Detroit, Mich.
Heat Timer Corp., New York, N. Y.
● Illinois Engineering Co., Chicago, Ill.
● Johnson Service Co., Milwaukee, Wis.
● Marsh Heating Equipment Co., Skokie, Ill.
McLarty Systems, Battle Creek, Mich.
Miller-Harris Instrument Co., Milwaukee, Wis.
● Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
● Powers Regulator Co., Skokie, Ill.
● Sarco Co., Inc., New York, N. Y.
● Sarcotherm Controls, Inc., New York, N. Y.
Tallmadge, Webster, Systems, Div. of Hoffman Specialty Co., Indianapolis, Ind.
● United Electric Controls Co., Watertown, Mass.
● Webster & Co., Warren, Camden, N. J.
● White-Rodgers Electric Co., St. Louis, Mo.

TIME SWITCHES

See Switches, Time

TOGGLE BOLTS

See Bolts, Toggle and Anchor

TONGS, PIPE

Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass
Williams & Co., J. H., Buffalo, N. Y.

TOOLS (CHISELS, PLIERS, SCREW DRIVERS, ETC.)

Barton Products, Inc., Defiance, O. (flexible shaft grinding wheel and wire brush)
Bernz Co., Otto, Rochester, N. Y.
Billings & Spencer Co., Hartford, Conn.
● Bonney Forge & Tool Works, Allentown, Pa.
Carlson & Sullivan, Monrovia, Calif. (steel tape-rule for reading diameter)
Churchward Welding Accessories, Jack, North Haven, Conn. (scaling hammer)
Crescent Tool Co., Jamestown, N. Y.
Dreier Brothers, Chicago, Ill. (level for determining pitch of pipe)
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Greene, Tweed & Co., North Wales, Pa.
● Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Harris, A. R., Hammond, Ind.
● Ingersoll-Rand Co., New York, N. Y.
Interstate Sales Co., New York, N. Y. (Protractor for layout work and center-finder protractor; angle meters for pipe layout)
Lufkin Rule Co., Saginaw, Mich. (steel tapes and folding rules)
Mall Tool Co., Chicago, Ill.
Mid-States Welder Mfg. Co., Chicago, Ill. (heavy duty power saw and file)
Millers Falls Co., Greenfield, Mass.
Misener Mfg. Co., Inc., Syracuse, N. Y. (Rotary hole saws)
Peck, Stow & Wilcox Co., Southington, Conn.
Pioneer Tool Co., Racine, Wis.
R C S Tool Sales Corp., Joliet, Ill. (reciprocating saw attachment)
Rawlplug Co., Inc., The, New York, N. Y. (drills for masonry)
Richmont, Inc., San Gabriel, Calif.
Rotary Concrete Drill Co., Pasadena, Calif. (Drill bits)
Salsbury Corp., Los Angeles, Calif. (air hammer)
Schild Mfg. Co., Milwaukee, Wis.
Snap-on Tools Corp., Kenosha, Wis.
Thompson & Son Co., The, Henry G., New Haven, Conn.
Three Point Industries, Chicago, Ill. (gage for determining pipe sizes)
U. S. Electrical Tool Co., Cincinnati, O.
● Walton Co., Hartford, Conn. (Tap extractors)
Williams & Co., J. H., Buffalo, N. Y.

TOOLS, FLARING, FOR TUBING

Armstrong Bros. Tool Co., Chicago, Ill.
● Bonney Forge & Tool Works, Allentown, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Key Co., East St. Louis, Ill.
Parker Appliance Co., The, Cleveland, O.
Penn Brass & Copper Co., Erie, Pa.
Sac Tool Mfg. Co., St. Louis, Mo.
Weatherhead Co., Cleveland, O.
Williams & Co., J. H., Buffalo, N. Y.
Wilson, Inc., Thomas C., Long Island City, N. Y.

TORCHES, BRAZING AND SOLDERING

Aeroil Products Co., Inc., South Hackensack, N. J.
Air Reduction Sales Co., New York, N. Y.
Atkins & Co., E. C., Indianapolis, Ind.
Bernz Co., Otto, Rochester, N. Y.

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Borm Mfg. Co., Elgin, Ill.
Century Aircraft Co., Los Angeles, Calif.
Clayton & Lambert Mfg. Co., Louisville, Ky.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Ergolyte Mfg. Co., Philadelphia, Pa.
Eutectic Welding Alloys Corp., New York, N. Y.
General Scientific Equipment Co., Philadelphia, Pa.
Goss Gas, Inc., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.
Ideal Industries, Inc., Sycamore, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Industrial Gas Div., Liquid Carbonic Corp., Chicago, Ill.
Insto-Gas Corp., Detroit, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Lee Co., K. O., Aberdeen, S. D.
Lenk Mfg. Co., Boston, Mass.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Marquette Mfg. Co., Minneapolis, Minn.
Mass Co., Davenport, Ia.
Mid-States Welder Mfg. Co., Chicago, Ill.
Minn-Kota Foundry & Mfg. Co., Fargo, N. D.
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Powder Weld Process Co., The, Brooklyn, N. Y.
Pressure Products Corp., Chicago, Ill.
Reiner & Campbell Co., Inc., Newark, N. J.
Sac Tool Mfg. Co., St. Louis, Mo.
Sight Feed Generator Co., West Alexandria, O.
Smith Welding Equipment Corp., Minneapolis, Minn.
Torit Mfg. Co., St. Paul, Minn.
Trindl Products, Ltd., Chicago, Ill.
Turner Brass Works, The, Sycamore, Ill.
Will-Weld Mfg. Co., Inc., Omaha, Neb.

TORQUE INDICATING WRENCHES

See Wrenches, Torque Indicating

TOWERS, COOLING, ATMOSPHERIC

American Cooling Tower Co., Kansas City, Mo.
●Binks Mfg. Co., Chicago, Ill.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Fluor Corp., Ltd., The, Los Angeles, Calif.
Harry Cooling Towers, Inc., New York, N. J.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Mo.
●Marley Co., Inc., Kansas City, Kan.
New England Cooling Tower Co., Boston, Mass.
Pennsylvania Engineering Wks., New Castle, Pa.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Refrigeration Appliances, Inc., Chicago, Ill.
Santa Fe Tank & Tower Co., Los Angeles, Calif.
Stewart Ice Machine Co., Pomona, Calif.
Thermal Industries, San Francisco, Calif.
●United Cooling Tower Co., Kansas City, Mo.
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
Water Cooling Tower Co., Chicago, Ill.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.

TOWERS, COOLING, MECHANICAL DRAFT

Acme Equipment Co., Muskogee, Okla.
Acme Industries, Inc., Jackson, Mich.
●Air & Refrigeration Corp., New York, N. Y.
American Cooling Tower Co., Kansas City, Mo
●Baltimore Aircoil Co., Inc., Baltimore, Md.
●Binks Mfg. Co., Chicago, Ill.
Buensod-Stacey, Inc., New York, N. Y.
Bush Mfg. Co., West Hartford, Conn.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Crowell & Dunn, Inc., New York, N. Y.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis Mo
Fluor Corp., Ltd., The, Los Angeles, Calif.
●Foster Wheeler Corp., New York, N. Y.
Goodfellow Co., E. D., Memphis, Tenn.
●Governair Corp., Oklahoma City, Okla.
Harry Cooling Towers, Inc., New York, N. Y.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
Kramer-Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Mo.
●Marley Co., Inc., Kansas City, Kan.
●Marlo Coil Co., St. Louis, Mo.
Murray Mfg. Co., D. J., Wausau, Wis.
Nevinger Mfg. Co., Inc., Greenville, Ill.
New England Cooling Tower Co., Boston, Mass.
Pennsylvania Engineering Wks., New Castle, Pa.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Santa Fe Tank & Tower Co., Los Angeles, Calif.
Tenney Engineering, Inc., Newark, N. J.
Thermal Industries, San Francisco, Calif.
●Trane Co., The, LaCrosse, Wis.
●United Conditioning Corp., New York, N. Y.
●United Cooling Tower Co., Kansas City, Mo.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vogt Machine Co., Henry, Louisville, Ky. (packaged unit with condenser, pump, etc.)
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
Water Cooling Tower Co., Chicago, Ill.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.

TOWERS, COOLING, NOISE ELIMINATION FOR

See Noise Elimination for Cooling Towers

TRANSFORMERS, ELECTRIC

Arjac Products Inc., Rochester, N. Y.
Bogue Electric Co., Paterson, N. J.
Canatsey Electric Mfg. Co., Kansas City, Mo.
Crown Controls Co., Inc., New Bremen, O.
Davis & Co., Dean W., Chicago, Ill.
Eisler Engineering Co., Inc., Newark, N. J.
Essex Wire Corp., Ft. Wayne, Ind.
●Fluid Systems, Inc., New Haven, Conn.
●General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hampton Electric Mfg. Co., Pittsburgh, Pa.
Jefferson Electric Co., Bellwood, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Newark Transformer Co., Linden, N. J.
Rex Welder & Engineering Co., Kansas City, Mo.
Sola Electric Co., Chicago, Ill. (voltage regulating)
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Super Electric Products Corp., Newark, N. J.
Taylor-Winfield Corp., Warren, O.
Trindl Products, Ltd., Chicago, Ill.
●Wagner Electric Corp., St. Louis, Mo.
Webster Electric Co., Racine, Wis.
Westinghouse Electric Corp., Pittsburgh, Pa.

TRANSMISSION DRIVES

See Drives, Chain, Flat Belt and V-Belt

TRANSMITTERS, PRESSURE AND TEMPERATURE

Manning, Maxwell & Moore, Inc., Stratford, Conn.
Taylor Instrument Companies, Rochester, N. Y.

TRAPS, MAGNETIC, FOR REMOVING TRAMP IRON FROM PIPE LINES

Columbia Engineering Service Co., San Francisco, Calif.

TRAPS, STEAM, MECHANICAL

Acker Organization, Inc., W. M., Cleveland, O.
American District Steam Co., North Tonawanda, N. Y.
●Anderson Co., V. D., The, Cleveland, O.
●Armstrong Machine Wks., Three Rivers, Mich.
Bailey Co., Chas. M., San Francisco, Calif.
●Barnes & Jones, Inc., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Boylston Steam Specialty Co., Chicago, Ill.
Burrows Mfg. Co., F. A. York, Pa.
Cashin Co., W. D., Boston, Mass.
Clark Mfg. Co., Cleveland, O.
Coe Mfg. Co., Painesville, O.
●Crane Co., Chicago, Ill.
Cryer Trap & Valve Co., Inc., New York, N. Y.
Davis Engineering Corp., Elizabeth, N. J.
●Dunham Co., C. A. Chicago, Ill.
Ellis Drier Co., Chicago, Ill.
●Fisher Governor Co., Marshalltown, Ia.
Healy Ruff Co., St. Paul, Minn.
●Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
●Illinois Engineering Co., Chicago, Ill.
Johnson Corp., The, Three Rivers, Mich.
Justus Steam Trap Co., Napanoch, N. Y.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Leavitt Machine Co., Orange, Mass.
●Marsh Heating Equipment Co., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
McAuley Trap Co., Pittsburgh, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Monash-Younker Co., Inc., Chicago, Ill.
Morehead Mfg. Co., Detroit, Mich.
Nason Co., Clarkston, Mich.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Rockwell Co., W. S., Fairfield, Conn.
●Sarco Co., Inc., New York, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.

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Squires Co., C. E., Cleveland, O.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
●Sterling, Inc., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Templeton Bros., Hyde Park, Mass.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Velan Engineering Co., Jersey City, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
●Webster & Co., Warren, Camden, N. J.
Williams Gauge Co., The, Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich. (Combination)
●Yarnall-Waring Co., Philadelphia, Pa.

TRAPS, STEAM, THERMOSTATIC

American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Cashin Co., W. D., Boston, Mass.
Cryer Trap & Valve Co., Inc., New York, N. Y.
●Dunham Co., C. A., Chicago, Ill.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
●Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
●Illinois Engineering Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
●Marsh Heating Equipment Co., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Monash-Younker Co., Inc., Chicago, Ill.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
●Powers Regulator Co., Skokie, Ill.
●Sarco Co., Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Squires Co., C. E., The, Cleveland, O.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
●Sterling, Inc., Milwaukee, Wis.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Templeton Bros., Hyde Park, Mass.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Vapor Specialty Co., New York, N. Y.
Velan Engineering Co., Jersey City, N. J.
●Webster & Co., Warren, Camden, N. J.

TREATMENT, FUEL OIL, TO PREVENT SLUDGE

Allen Co., Robert G., Mechanicsville, N. Y.
Alrose Chemical Co., Providence, R. I.
American Sand-Banum Co., Inc., New York, N. Y.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Bird-Archer Co., Philadelphia, Pa.
Celco Corp., New York, N. Y.
Elraco Engineering Co., Los Angeles, Calif.
Hercules Chemical Co., Inc., New York, N. Y.
Madden & Co., P. E., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Aluminate Corp., Chicago, Ill.
North American Mogul Products Co., The, Cleveland, O.
O'Brien Industries, Caldwell, N. J.
% Proportioneers, Inc. %, Providence, R. I.
Perolin Co., Inc., Chicago, Ill.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Western Chemical Co., Kansas City, Mo.

TREATMENT, STEAM SYSTEM, TO INHIBIT CORROSION

American Water Softener Co., Philadelphia, Pa.
American Well Wks., Aurora, Ill.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Apex All Weather Products, Chicago, Ill.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
●Brown Electro Co., Oklahoma City, Okla.
Calgon, Inc., Pittsburgh, Pa.
Cannon Chemical Co., Inc., Cambridge, Mass.
Carbide and Carbon Chemicals Div., Carbide & Carbon Corp., New York, N. Y.
Chemical Engineering Co., Dallas, Tex.
Chemical Solvent Co., Birmingham, Ala.
Cochrane Corp., Philadelphia, Pa.
Continental Products Co., Euclid, O.
Dearborn Chemical Co., Chicago, Ill.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Elgin Softener Corp., Elgin, Ill.
Fischer & Porter Co., Hatboro, Pa.
Graver Water Conditioning Co., New York, N. Y.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hercules Chemical Co., Inc., New York, N. Y.
Kenite Laboratory, Inc., Madison, N. J.
Madden & Co., P. E., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.
McRay Sales Co., South Pasadena, Calif.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milton Roy Co., Philadelphia, Pa.
National Aluminate Corp., Chicago, Ill.
North American Mogul Products Co., The, Cleveland, O.
O'Brien Industries, Caldwell, N. J.
Perolin Co., Inc., Chicago, Ill.
% Proportioneers, Inc. %, Providence, R. I.
●Research Products Corp., Madison, Wis.
Rid-Sludge Div., Aulwood Mfg. Co., St. Paul Minn. (vapor treatment to remove sludge from heating system)
Saverite Engineering Co., Hoboken, N. J.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Vinco Co., Inc., The, New York, N. Y.
Warren Refining & Chemical Co., Cleveland, O.
Water Treatment Co. of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
X Laboratories, Inc., New York, N. Y.

TREATMENT, WATER, TO INHIBIT CORROSION

Agava Products, Inc., Jersey City, N. J.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Cyanamid & Chemical Corp., New York, N. Y.
American K. A. T. Corp., Garwood, N. J.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Bogue Electric Co., Paterson, N. J.
Brown Electro Co., Oklahoma City, Okla.
Calgon, Inc., Pittsburgh, Pa.
Cannon Chemical Co., Inc., Cambridge, Mass.
Carbide and Carbon Chemicals Div., Carbide & Carbon Corp., New York, N. Y.
Chemical Engineering Co., Dallas, Tex.
Chemical & Metallurgical Products, Inc., New York, N. Y.
Chemical Solvent Co., Birmingham, Ala.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Culligan Soft Water Institute, Northbrook, Ill.
Dearborn Chemical Co., Chicago, Ill.
Dowell Inc., Tulsa, Okla.
Elgin Softener Corp., Elgin, Ill.
Ferro-Nil Corp., New York, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Fischer & Porter Co., Hatboro, Pa.
General Filter Co., Ames, Ia.
Graver Water Conditioning Co., New York, N. Y.
Grief, Edward C., Bogota, N. J.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hagan Corp., Pittsburgh, Pa.
Heilman Boiler Wks., Inc., Allentown, Pa.
Kenite Laboratory, Inc., Madison, N. J.
Layne & Bowler, Inc., Memphis, Tenn.
Madden & Co., P. E. Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.
Maintenance Engineering Corp., Houston, Tex.
McRay Sales Co., South Pasadena, Calif.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milton Roy Co., Philadelphia, Pa.
Monsanto Chemical Co., St. Louis, Mo.
National Aluminate Corp., Chicago, Ill.
North American Mogul Products Co., The, Cleveland, O.
O'Brien Industries, Caldwell, N. J.
%Proportioneers, Inc., %, Providence, R. I.
Permutit Co., New York, N. Y.
Perolin Co., Inc., Chicago, Ill.
Red Jacket Mfg. Co., Davenport, Ia.
●Refinite Corp., Omaha, Nebr.
●Research Products Corp., Madison, Wis.
Rodwell Engineering & Sales Co., Omaha, Neb.
Saverite Engineering Co., Hoboken, N. J.
Schror, Dr. Adolph, East Orange, N. J.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sudbury Laboratory, South Sudbury, Mass.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Uniflow Mfg. Co., Erie, Pa.
Vinco Co., Inc., The, New York, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Warlo Corp., New York, N. Y.
Water Refining Co., Ft. Wayne, Ind.
Water Service Laboratories, Inc., New York, N. Y.
Water Treatment Company of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
Worthington Pump & Machinery Corp., Harrison, N. J.
X Laboratories, Inc., New York, N. Y.

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TREATMENT, WATER, FOR SLIME AND ALGAE CONTROL

Alrose Chemical Co., Providence, R. I.
American Sand-Banum Co., Inc. New York, N. Y.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Aqua Electric Scale Control, Inc., Cleveland, O.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Brown Electro Co., Oklahoma City, Okla.
Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
Carolina Aniline & Extract Co., Charlotte, N. C.
Chemical Engineering Co., Dallas, Tex.
Chemical Solvent Co., Birmingham, Ala.
Cooper Co., Clark, Palmyra, N. J.
Dearborn Chemical Co., Chicago, Ill.
Dowell Inc., Tulsa, Okla.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Fischer & Porter Co., Hatboro, Pa.
General Filter Co., Ames, Ia.
General Ozone Corp., Chicago, Ill.
Graver Water Conditioning Co., New York, N. Y.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hagan Corp., Pittsburgh, Pa.
Kenite Laboratory, Inc., Madison, N. J.
Layne & Bowler, Inc., Memphis, Tenn.
Madden & Co., P. E., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.
McRay Sales Co., South Pasadena, Calif.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milton Roy Co., Philadelphia, Pa.
Monsanto Chemical Co., St. Louis, Mo.
National Aluminate Corp., Chicago, Ill.
North American Mogul Products Co., The, Cleveland, O.
Norwood Associated Engineers Inc., Springfield, Mass.
Oakite Products. Inc., New York, N. Y.
O'Brien Industries, Caldwell, N. J.
Perolin Co., Inc., Chicago, Ill.
% Proportioneers, Inc., %, Providence, R. I.
Permutit Co., New York, N. Y.
●Refinite Corp., Omaha, Nebr.
Solvay Sales Div., Allied Chemical & Dye Corp., New York, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Water Treatment Co. of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.

TRY-COCKS, BOILER

Bailey Co., Chas. M., San Francisco, Calif.
Chicago Specialty Mfg. Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Diamond Power Specialty Corp., Lancaster, O.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Keckley Co., O. C., Chicago, Ill.
Lunkenheimer Co., Cincinnati, O.
Penberthy Injector Corp., Detroit, Mich.
Reliance Gauge Column Co., Cleveland, O.
Robert Mfg. Co., Los Angeles, Calif.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

TUBE CLEANERS

See Cleaners, Tube

TUBES, BOILER

Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Globe Steel Tubes Co., Milwaukee, Wis.
H & H Tube & Mfg. Co., Detroit, Mich.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
Standard Tube Co., Detroit, Mich.
Trent Tube Co., East Troy, Wis. (stainless)

TUBES, CONDENSER

American Brass Co., Waterbury, Conn.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bridgeport Brass Co., Bridgeport, Conn.
●Bundy Tubing Co., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Globe Steel Tubes Co., Milwaukee, Wis.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
●Revere Copper and Brass Incorporated, New York, N. Y.
Reynolds Metals Co., Louisville, Ky.
Scovill Mfg. Co., Waterville Div., Waterville, Conn. (copper base)
Standard Tube Co., Detroit, Mich.
Timken Roller Bearing Co., Canton, O.
Trent Tube Co., East Troy, Wis. (stainless)
Warren Foundry & Pipe Corp., New York, N. Y.
●Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit Mich.
York Corp., York, Pa.

TUBES, PITOT

Defender Instrument and Regulator Co., St. Louis, Mo.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Meriam Instrument Co., The, Cleveland, O.
●Taylor Instrument Companies, Rochester, N. Y.

TUBING, ALUMINUM

Aluminum Co. of America, Pittsburgh, Pa.
Colonial Alloys Co., Metals Div., Philadelphia, Pa.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
Penn Brass & Copper Co., Erie, Pa.
●Revere Copper and Brass Incorporated, New York, N. Y.
Reynolds Metals Co., Louisville, Ky.
Viking Copper Tube Co., Cleveland, O.
●Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit, Mich.

TUBING BENDERS

See Benders, Tubing

TUBING, BRASS AND COPPER

American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Everhot Products Co., Chicago, Ill.
H & H Tube & Mfg. Co., Detroit, Mich.
Helical Tube Corp., East Orange, N. J.
Hussey & Co., C. G., Pittsburgh, Pa.
Keeney Mfg. Co., Newington, Conn. (Chrome plated)
Kensico Tube Co., Mt. Kisco, N. Y.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Penn Brass & Copper Co., Erie, Pa.
Phelps Dodge Copper Products Corp., British American Tube Div., New York, N. Y.
Reading Tube Corp., Long Island City, N. Y.
●Revere Copper and Brass Incorporated, New York, N. Y.
Roberts Tube Works, Detroit, Mich.
Viking Copper Tube Co., Cleveland, O.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.

TUBING, BRONZE

American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Helical Tube Corp., East Orange, N. J.
●Revere Copper and Brass, Incorporated, New York, N. Y.

TUBING CUTTERS

See Cutters, Tubing

TUBING, DUPLEX

American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Pacific Tube Co., Los Angeles, Calif. (Non-ferrous to ferrous)
Republic Steel Corp., Steel & Tubes Div., Cleveland, O. (Steel and copper)

TUBING, FINNED

●Aerofin Corp., Syracuse, N. Y.
American Coils Co., Newark, N. J.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co. West Harford, Conn.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●G. & O. Mfg. Co., New Haven, Conn.
Griscom-Russell Co., The, New York, N. Y.
Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Kramer Trenton Co., Trenton, N. J.
●McCord Corp., Detroit, Mich.
Merchant & Evans Co., Philadelphia, Pa.
Minimite Co., Chicago, Ill.
Peerless of America, Inc., Chicago, Ill.

● Advertisement in this issue. See Index to Advertisers, page 128d

Refrigeration Economics Co., Inc., Canton, O.
●Rempe Co., Chicago, Ill.
●Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Tenney Engineering, Inc., Newark, N. J.
Thermek Sales Co., Whitewater, Wis. (spined)
Tilco-Fin-Tubing Div., David E. Kennedy, Inc., Brooklyn, N. Y
Vapor Heating Corp., Chicago, Ill.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich. (Aluminum, copper)
●Young Radiator Co., Racine, Wis.

TUBING, MAGNESIUM

Dow Chemical Co., The, Midland, Mich.

TUBING, NICKEL AND NICKEL ALLOY

Agaloy Tubing Co., Springfield, O.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Bridgeport Brass Co., Bridgeport, Conn.
●Bundy Tubing Co., Detroit, Mich.
Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
Helical Tube Corp., East Orange, N. J.
International Nickel Co., Inc., The, New York, N. Y.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Revere Copper and Brass Incorporated, New York, N. Y.
Trent Tube Co., East Troy, Wis.

TUBING, PLASTIC

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
American Agile Corp., Cleveland, O.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Extruded Plastics, Inc., Norwalk, Conn.
Flexible Tubing Corp., Guilford, Conn.
Gates Rubber Co., The, Denver, Colo.
General Ceramics & Steatite Corp., Keasbey, N. J.
General Electric Co., Chemical Dept., Pittsfield, Mass.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Haveg Corp., Newark, Del.
Irvington Varnish and Insulator Co., Irvington, N. J.
Mills Corp., Elmer E., Chicago, Ill.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
Presstite Engineering Co., St. Louis, Mo.
Resistoflex Corp., Belleville, N. J.
Sandee Mfg. Co., Chicago, Ill.
Saran Lined Pipe Co., Ferndale, Mich.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

TUBING, SILVER CLAD AND SILVER ALLOY

Baker & Co., Inc., Newark, N. J.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.

TUBING, STEEL, ALLOY, SEAMLESS

Agaloy Tubing Co., Springfield, O.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, ALLOY, WELDED

Agaloy Tubing Co., Springfield, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Duraloy Co., Scottdale, Pa.
Electric Steel Foundry Co., Portland, Ore.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
Pacific Tube Co., Los Angeles, Calif.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
●Revere Copper and Brass Incorporated, New York, N. Y.
Standard Tube Co., Detroit, Mich.
Trent Tube Co., East Troy, Wis.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, SEAMLESS

Agaloy Tubing Co., Springfield, O.
Armco Steel Corp., Middletown, O.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Everhot Products Co., Chicago, Ill.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, STAINLESS

Agaloy Tubing Co., Springfield, O.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Alloy Tube Div., Union, N. J.
Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
Helical Tube Corp., East Orange, N. J.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Pypon Co., Pittsburgh, Pa.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
Standard Tube Co., Detroit, Mich.
Timken Roller Bearing Co., Canton, O.
Trent Tube Co., East Troy, Wis.
Tri-Clover Machine Co., Kenosha, Wis.

TUBING, STEEL, WELDED

Agaloy Tubing Co., Springfield, O.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.
Bethlehem Steel Co., Bethlehem, Pa.
●Bundy Tubing Co., Detroit, Mich.
Everhot Products Co., Chicago, Ill.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
National Tube Div., United States Steel Corp., Pittsburgh, Pa.
Nikoh Tube Co., Chicago, Ill.
Pacific Tube Co., Los Angeles, Calif.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pittsburgh Tube Co., Pittsburgh, Pa.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
●Revere Copper and Brass Incorporated, New York, N. Y.
Rochester Products Div., Rochester, N. Y.
Sharon Steel Corp., Sharon, Pa.
South Chester Tube Co., Chester, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Standard Tube Co., Detroit, Mich.
Thermapanels, Inc., San Jose, Calif.
●Wheatland Steel Products Co., Philadelphia, Pa.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, TITANIUM

Superior Tube Co., Norristown, Pa.

TURBINES, MECHANICAL DRIVE

Carling Turbine Blower Co., Worcester, Mass.
Coppus Engineering Corp., Worcester, Mass.
Dean Hill Pump Co., Indianapolis, Ind.
●De Laval Steam Turbine Co., Trenton, N. J.
Elliott Co., Jeannette, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Murray Iron Wks. Co., Burlington, Ia.
Pyle-National Co., The, Chicago, Ill.
Steam Turbine Div., Worthington Pump and Machinery Corp., Wellesville, N. J.
Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whiton Machine Co., New London, Conn.
●Wing Mfg. Co., L. J., Linden, N. J.

2, 3 AND 4-WAY VALVES

See Valves, 2, 3 and 4-way

ULTRASONIC DUST AND FUME COLLECTION

See Collection, Dust and Fume, Ultrasonic

UNDERGROUND PIPING

See Conduit, Underground Piping

UNDERWATER HEATERS

See Heaters, Steam Jet, for Liquids

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UNIONS, BRASS

Acheson Mfg. Co., Rankin, Pa.
Commonwealth Brass Corp., Detroit, Mich.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
●General Fittings Co., Providence, R. I.
Gilbert Brass Foundry Co., St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
Jerecki Mfg. Co., Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
King Union Co., Inc., Hillsgrove, R. I.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
Phoenix Brass Fittings Corp., Irvington, N. J.
●Powell Co., Wm., Cincinnati, O.
●Rhode Island Fittings Co., Providence, R. I.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Weatherhead Co., The, Cleveland, O.

UNIONS, MALLEABLE, BRASS SEAT

Beaton & Corbin Mfg. Co., Southington, Conn.
Corley Co., Inc., The, Jersey City, N. J.
●Crane Co., Chicago, Ill.
Dart Union Co., E. M., Providence, R. I.
Das Div. of Defiance Automatic Screw Co., Defiance, O.
Detroit Brass & Malleable Wks., Detroit, Mich.
●Fairbanks Co., New York, N. Y.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●General Fittings Co., Providence, R. I.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jefferson Union Co., Inc., New York, N. Y.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
King Union Co., Inc., Hillsgrove, R. I.
Malleable Iron Fittings Co., Branford, Conn.
●Rhode Island Fittings Co., Providence, R. I.
Rockwood Sprinkler Co., Worcester, Mass.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

UNIONS, ORIFICE

Altens Foundry & Machine Works, Inc., Lancaster, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Conoflow Corp., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.

UNIONS, STEEL

Capitol Mfg. & Supply Co., Columbus, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Champion Machine & Forging Co., Cleveland, O.
●Crane Co., Chicago, Ill.
Dart Union Co., E. M., Providence, R. I.
DAS Div. of Defiance Automatic Screw Co., Defiance, O.
●Fairbanks Co., New York, N. Y.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Gilbert Brass Foundry Co., St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
●Henry Valve Co., Melrose Park, Ill.
Rockwood Sprinkler Co., Worcester, Mass.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

UNIT COOLERS

See Coolers, Unit

UNIT HEATERS

See Heaters, Unit

UNIT VENTILATORS

See Ventilators, Unit

UNITS, AIR CONDITIONING, CENTRAL STATION TYPE

Self contained blower, heating and/or cooling coil, filter, humidifier unit for remote location and duct air distribution

●Air & Refrigeration Corp., New York, N. Y.
Alton Mfg. Co., Dallas, Tex.
●American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
American Moistening Co., Providence, R. I.
American Thermal Industries, Inc., Detroit, Mich.
Anetsberger Bros., Inc., Northbrook, Ill.
Bahnson Co., Winston-Salem, N. C.
Baker Refrigeration Corp., South Windham, Me.
Blazer, M., & Son, Passaic, N. J.
Bryant Heater Div., Affiliated Gas Equipment Co. Inc., Cleveland, O.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Frigidaire Div., General Motors Corp., Dayton, O.
Gannon Co., Russell R., Cincinnati, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
●Governair Corp., Oklahoma City, Okla.
Hastings Air Conditioning Co., Hastings, Neb.
Howe Ice Machine Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Marlo Coil Co., St. Louis, Mo.
●McQuay, Inc., Minneapolis, Minn.
Meyer Furnace Co., The, Peoria, Ill.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●Niagara Blower Co., New York, N. Y.
Palmer Mfg. Corp., Phoenix, Ariz.
Parks-Cramer Co., Fitchburg, Mass.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Rigidbilt Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sterling Air Conditioning Corp., Washington, D. C.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, HORIZONTAL PACKAGE TYPE

Self contained blower, cooling and/or heating coil, filter, humidifier unit for ceiling or platform location in space conditioned, for connection to remote compressor or cold water supply, and steam or hot water

●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
American Thermal Industries, Inc., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
Blazer, M., & Son, Passaic, N. J.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
Conditionaire Unit Co., Chicago, Ill.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Frigidaire Div., General Motors Corp., Dayton, O.
Gannon Co., Russell R., Cincinnati, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
●Governair Corp., Oklahoma City, Okla.
Hastings Air Conditioning Co., Hastings, Neb.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Marlo Coil Co., St. Louis, Mo.
●McQuay, Inc., Minneapolis, Minn.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●Niagara Blower Co., New York, N. Y.
Parks-Cramer Co., Fitchburg, Mass.
Refrigeration Appliances Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.

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Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, INDUSTRIAL TYPE

●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
●American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
American Thermal Industries, Inc., Detroit, Mich.
Anetsberger Bros., Inc., Northbrook, Ill.
Baker Refrigeration Corp., South Windham, Me.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blazer, M., & Son, Passaic, N. J.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Carbide & Carbon Chemicals Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
●Carrier Corp., Syracuse, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
●Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
Gannon Co., Russell R., Cincinnati, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
●Governair Corp., Oklahoma City, Okla.
Haertel Co., Walter, Minneapolis, Minn.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Lintern Co., Berea, O.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Marlo Coil Co., St. Louis, Mo.
●McQuay, Inc., Minneapolis, Minn.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●New York Blower Co., Chicago, Ill. (Make-up air units)
●Niagara Blower Co., New York, N. Y.
Parks-Cramer Co., Fitchburg, Mass.
Pfening Co., Fred D., Columbus, O.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Somers, Inc., H. J., Detroit, Mich.
●Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, REVERSE REFRIGERATION CYCLE

Acme Industries, Inc., Jackson, Mich.
Drayer & Hanson, Inc., Los Angeles, Calif.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
Muncie Gear Works, Inc., Muncie, Ind.
Northwest Heating, Inc., Portland, Ore.
Terra-Temp Co., Inc., Indianapolis, Ind.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Webber Engineering Corp., Indianapolis, Ind.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, SUMMER, EVAPORATIVE COOLING TYPE

For cooling by evaporation, no dehumidification

Air Equipment Co., Denver, Colo.
●Air & Refrigeration Corp., New York, N. Y.
Alton Mfg. Co., Dallas, Tex.
●American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
American Moistening Co., Providence, R. I.
Aqua-Mist Co., Topeka, Kans.
Auburn Foundry, Inc., Stoker Div., Auburn, Ind.
Bahnson Co., Winston-Salem, N. C.
Barwick Mfg. Corp., Wichita, Kan.
Buensod-Stacey, Inc., New York, N. Y.
Campbell Co., E. K., Kansas City, Mo.
●Carrier Corp., Syracuse, N. Y.
Central States Mfg. Co., Inc., Arkansas City, Kan.
Climax Machinery Co., Indianapolis, Ind.
Comfort Products Corp., Dallas, Tex.
Essick Mfg. Co., Los Angeles, Calif.
●Farr Co., Los Angeles, Calif.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Great National Air Conditioning Corp., Oklahoma City, Okla.
Heating Assurance, Inc., Spokane, Wash.
International Metal Products Co., Phoenix, Ariz.
Kool-Sleep, Inc., Cambridge, O.
Lennox Furnace Co., Marshalltown, Ia.
●Little Gaint Vaporizer Co., Inc., Oklahoma City, Okla. (vaporizers and pumps for evaporative coolers)
Martin Fan & Blower Co., Chicago, Ill.
Montag Stove & Furnace Works, Portland, Ore.
Morey, Dan, Los Angeles, Calif. (aspen fiber replacement mats)
Mountain States Equipment Co., Denver, Colo.
National Engineering & Mfg. Co., Kansas City, Mo.
National Gas Equipment Co., Inc., Terrell, Tex.
Ohio Foundry & Mfg. Co., Steubenville, O.
Palmer Mfg. Co., Phoenix, Ariz.
Polaire Cooler Co., Inc., Phoenix, Ariz.
Rheem Mfg. Co., New York, N. Y.
Rhode Island Humidifier & Ventilating Co., Boston, Mass.
United Electric Service Co., Wichita Falls, Tex.
●Utility Appliance Corp., Los Angeles, Calif.
Western Blower Co., Seattle, Wash.
X L Refrigerating Co., Chicago, Ill.

UNITS, AIR CONDITIONING, SUMMER, ROOM TYPE, FLOOR CABINET, REMOTE COMPRESSOR OR COLD WATER, UNDER 3 TONS CAPACITY

Self contained blower, coil, filter unit for connection to remote compressor or cold water supply

●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Hastings Air Conditioning Co., Hastings, Neb.
International Mfg. Co., Oklahoma City, Okla.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●McQuay, Inc., Minneapolis, Minn.
Nat Corp., Kansas City, Mo.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Rinehart Inc., Richmond, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Temp-Control Inc., Peoria, Ill.
●Trane Co., The, La Crosse, Wis.
Unified Air Conditioner Co., Duluth, Minn.
United Conditioning Corp., New York, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, SUMMER, ROOM TYPE, FLOOR CABINET, SELF CONTAINED COMPRESSOR, UNDER 3 HP

Self contained blower, coil, compressor, filter unit

Automatic Firing Corp., St. Louis, Mo.
Baker Refrigeration Corp., South Windham, Me.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Fedders-Quigan Corp., Buffalo, N. Y.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Marlo Coil Co., St. Louis, Mo.
Muntz TV, Inc., Chicago, Ill.
Nat Corp., Kansas City, Mo.
Pacific Mfg. Co., Cleveland, O.
Philco Corp., Philadelphia, Pa.
Rinehart Inc., Richmond, Ind.
Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
Scott-Newcomb, Inc., St. Louis, Mo.
Sutton Corp., O. A., Wichita, Kan.
●United States Air Conditioning Corp., Minneapolis, Minn.

●Viking Mfg. Corp., Cleveland, O.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, SUMMER, STORE TYPE, FLOOR CABINET, SELF CONTAINED COMPRESSOR, 3 HP AND OVER

Self contained blower, coil, compressor, filter unit with air discharge approximately 6 ft above floor

American Thermal Industries, Inc., Detroit, Mich.
Automatic Firing Corp., St. Louis, Mo.
Baker Refrigeration Corp., South Windham, Me.
●Brunner Mfg. Co., Utica, N. Y.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
●Governair Corp., Oklahoma City, Okla.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Nat Corp., Kansas City, Mo.
Nevinger Mfg. Co., Inc., Greenville, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Sterling Air Conditioning Corp., Washington, D. C.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United Conditioning Corp., New York, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Corp., Cleveland, O.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, WINTER, ROOM TYPE, FLOOR CABINET

Self contained blower, filter, heating coil, humidifier unit

●Air & Refrigeration Corp., New York, N. Y.
●Aladdin Heating Corp., Oakland, Calif.
Auburn Burner Co., Auburn, Ind.
Baker Refrigeration Corp., South Windham, Me.
Bryant Industrial Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
●Buffalo Forge Co., Buffalo, N. Y.
●Campbell Heating Co., Des Moines, Ia.
●Carrier Corp., Syracuse, N. Y.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Dalzen Mfg. Co., St. Clair, Mich.
Drayer & Hanson, Inc., Los Angeles, Calif.
Johnson Co., S. T., Philadelphia, Pa.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kehm Corp., The, Chicago, Ill.
●Kennard Corp., St. Louis, Mo.
●McQuay, Inc., Minneapolis, Minn.
Refrigeration Economics Co., Inc., Canton, O.
●Reznor Mfg. Co., Mercer, Pa.
Somers, Inc., H. J., Detroit, Mich.
●Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Unified Air Conditioner Co., Duluth, Minn.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Radiator Corp., Detroit, Mich.
Viking Mfg. Corp., Cleveland, O.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, YEAR AROUND, ROOM TYPE, FLOOR CABINET

Self contained blower, cooling and heating coil, filter, humidifier unit for connection to remote compressor or cold water supply, and steam or hot water supply

Acme Industries, Inc., Jackson, Mich.
●Air & Refrigeration Corp., New York, N. Y.
Auburn Burner Co., Auburn, Ind.
Baker Refrigeration Corp., South Windham, Me.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
Gannon Co., Russell R., Cincinnati, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
Hastings Air Conditioning Co., Hastings, Neb.
International Mfg. Co., Oklahoma City, Okla.
Jaden Mfg. Co., Hastings, Neb.
Johnson Co., S. T., Philadelphia, Pa.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo.
●McQuay, Inc., Minneapolis, Minn.
Nat Corp., Kansas City, Mo.
●Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
●Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Unified Air Conditioner Co., Duluth, Minn.
●United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Corp., Cleveland, O.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
York Corp., York, Pa.

UNITS, CONDENSATE DISPOSAL, FOR AIR CONDITIONING EQUIPMENT

Eastern Industries, Inc., New Haven, Conn.
●Little Giant Vaporizer Co., Inc., Oklahoma City, Okla.

UNITS, COOLING, WINDOW TYPE

American Stove Co., St. Louis, Mo.
Automatic Firing Corp., St. Louis, Mo.
Baltimore Porcelain Steel Corp., Baltimore, Md.
●Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Crowell & Dunn, Inc., New York, N. Y.
●Fedders-Quigan Corp., Buffalo, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Lipman Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Mitchell Mfg. Co., Chicago, Ill.
National Engineering & Mfg. Co., Kansas City, Mo.
National Gas Equipment Co., Inc., Terrell, Tex.
Pacific Mfg. Co., Cleveland, O.
Pleasantaire Corp., Washington, D. C.
Radio Corp. of America, Camden, N. J.
Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
Sterling Air Conditioning Corp., Washington, D. C.
●United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Corp., Cleveland, O.
York Corp., York, Pa.

UNITS, FUEL OIL, HEATING, PUMPING AND STRAINING

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Davis Engineering Corp., Elizabeth, N. J.
Drying Systems, Inc., Chicago, Ill.
Engineer Co., New York, N. Y.
Faber Engineer Co., Philadelphia, Pa.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Graham Mfg. Co., Inc., New York, N. Y.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
Leahy Mfg. Co., Los Angeles, Calif.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Peabody Engineering Corp., New York, N. Y.
●Ray Oil Burner Co., San Francisco, Calif.
Staples & Pfeiffer, San Francisco, Calif.
Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y.
Tuthill Pump Co., Chicago, Ill.

UNITS, STERILIZING, AIR

Air Purification Service, Inc., New York, N. Y.
Germatrol Corp., Pittsburgh, Pa.
Hanovia Chemical & Mfg. Co., Newark, N. J.
Health Trola Div., Excel Heating & Air Conditioning Co., Chicago, Ill.
Iron City Chemical Co., Valencia, Pa.
Lientz Co., B. P., Kansas City, Mo.
National Air Conditioning, Inc., Johnstown, Pa.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Robertson Sons, Inc., M. F., Lansdowne, Pa.

UNITS, WINDOW VENTILATOR AND FILTER

Airgard Mfg. Co., Chicago, Ill.
American Coolair Corp., Jacksonville, Fla.
Berns Mfg. Co., Chicago, Ill.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Health Trola Div., Excel Heating & Air Conditioning Co., Chicago.

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Ilg Electric Ventilating Co., Chicago, Ill.
Kaiser Co., H. S., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Mellish & Murray Co., Chicago, Ill.
Palmer Mfg. Corp., Phoenix, Ariz.
Reed Unit-Fans, Inc., New Orleans, La.
Reliable Metal Engineering Co., Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Somers Inc., H. J., Detroit, Mich.
Standard Electric Mfg. Co., West Berlin, N. J.
Unified Air Conditioner Co., Duluth, Minn.
●Utility Appliance Corp., Los Angeles, Calif.

UNIVERSAL JOINTS

See Joints, Universal, for Operating Valves

VACUUM CLEANERS FOR BOILERS

See Cleaners, Vacuum, for Boilers

VACUUM GAGES

See Gages, Indicating, Vacuum

VACUUM HEATING SYSTEMS

See Systems, Heating, Vacuum

VACUUM PUMPS

See Pumps, Vacuum

VACUUM RECORDERS

See Recorders, Pressure and Vacuum

VALVE OPERATORS

See Operators, Valve

VALVE RESEATERS

See Reseaters, Valve

VALVES, AIR OPERATING

American Moistening Co., Providence, R. I.
Bailey Co., Chas. M., San Francisco, Calif.
Barksdale Valves, Los Angeles, Calif.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bellows Co., Akron, O.
Bristol Co., The, Waterbury, Conn.
Clark Controller Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hunt & Son, Inc., C. B., Salem, O.
●Illinois Engineering Co., Chicago, Ill.
Keller Tool Co., Grand Haven, Mich.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Ledeen Mfg. Co., Los Angeles, Calif.
●Leslie Co., Lyndhurst, N. J.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Norwalk Valve Co., South Norwalk, Conn.
Paul Valve Corp., New York, N. Y.
●Powell Co., Wm., The, Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
Schade Valve Mfg. Co., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Wilson Engineering Corp., Chicago, Ill.

VALVES, ANGLE

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Beckett & Co., Inc., Thomas, Dallas, Tex.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Bordo Co., Inc., L. J., Glenside, Pa. (Plug)
Carpenter Mfg. Corp., The, Cleveland, O.
Central Brass Mfg. Co., Cleveland, O.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., The, Cleveland, O.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
De Zurik Shower Co., Sartell, Minn.
Duriron Co., The, Dayton, O. (acid resisting)
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
Farris Engineering Corp., Palisades Park, N. J.
General Ceramics & Steatite Corp., Keasbey, N. J.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
●Henry Valve Co., Melrose Park, Ill.
Hills-McCanna Co., Chicago, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
Jarecki Valve Div. of H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Klingerit, Inc., New York, N. Y.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard Rubber)
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Marsh Valve Co., Dunkirk, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Morse-Smith-Morse, Inc., Watertown, Mass.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwell Mfg. Co., Meter and Valve Div., Pittsburgh, Pa.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Shank Co., Cyrus, Chicago, Ill.
Stockham Valves & Fittings, Birmingham, Ala.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
White Flomatic Corp., Hoosick Falls, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, BALANCING, FOR FORCED HOT WATER HEATING SYSTEMS

Detroit Lubricator Co., Detroit, Mich.
Farris Engineering Corp., Palisades Park, N. J.
G & H Mfg. Co., Philadelphia, Pa.
General Heaters & Regulators Co., Chicago, Ill.
Hammond Brass Works, Hammond, Ind.
●Hoffman Specialty Co., Indianapolis, Ind.
Homestead Valve Mfg. Co., Coraopolis, Pa.
●Illinois Engineering Co., Chicago, Ill.
J O Mfg. Co., South Gate, Calif.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marsh Heating Equipment Co., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
●Ohio Brass Co., Mansfield, O.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.

VALVES, BAR STOCK

Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Grove Regulator Co., Oakland, Calif.
Guardian Products Corp., Michigan City, Ind.
Hammel-Dahl Co., Providence, R. I.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Paul Valve Corp., New York, N. Y.

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Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., The, Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Shank Co., Cyrus, Chicago, Ill.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, BLOW-OFF

Barrett Machine Co., Pittsburgh, Pa.
Bordo Co., Inc., L. J., Glenside, Pa.
Carpenter Mfg. Corp., The, Cleveland, O.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Edward Valves, Inc., East Chicago, Ind.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Keckley Co., O. C., Chicago, Ill.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Madden & Co., P. E., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
●McDonnell & Miller, Inc., Chicago, Ill.
Norgren Co., C. A., Englewood, Colo.
Ohio Injector Co., Wadsworth, O.
Paul Valve Corp., New York, N. Y.
●Powell Co., Wm., The, Cincinnati, O.
Schade Valve Mfg. Co., Philadelphia, Pa.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Wilson Engineering Corp., Chicago, Ill.
●Yarnall-Waring Co., Philadelphia, Pa.

VALVES, BUTTERFLY

Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
●Fisher Governor Co., Marshalltown, Ia.
●Fischer & Porter Co., Hatboro, Pa.
General Ceramics & Steatite Corp., Keasbey, N. J.
●General Controls Co., Glendale, Calif.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
Homestead Valve Mfg. Co., Coraopolis, Pa.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Ohio Injector Co., Wadsworth, O.
Norwalk Valve Co., South Norwalk, Conn.
●Powell Co., Wm., The, Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
Rockwell Co., W. S., Fairfield, Conn.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Tri-Clover Machine Co., Kenosha, Wis.

VALVES, CHECK

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
American Hard Rubber Co., New York, N. Y. (Rubber lined)
Aminco Refrigeration Products Co., Detroit, Mich.
Amp Corp., St. Louis, Mo.
Barrett, Haentjens & Co., Hazelton, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cochrane Corp., Philadelphia, Pa.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Durabla Mfg. Co., New York, N. Y.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
Foster Engineering Co., Union, N. J.
●Frick Co., Waynesboro, Pa.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
General Ceramics & Steatite Corp., Keasbey, N. J. (chemical stoneware & porcelain)
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Greer Hydraulics, Inc., Brooklyn, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hammond Brass Works, Hammond, Ind.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
●Henry Valve Co., Melrose Park, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Imperial Brass Mfg. Co., Chicago, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
James-Pond-Clark, Pasadena, Calif.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Mansfield & Green, Cleveland, O.
McRae Valve Co., Los Angeles, Calif.
Milwaukee Valve Co., Milwaukee, Wis.
Morse-Smith-Morse Inc., Watertown, Mass.
●Mueller Brass Co., Port Huron, Mich.
Norgren Co., C. A., Englewood, Colo.
Northern Indiana Brass Co., Elkhart, Ind.
Norwalk Valve Co., South Norwalk, Conn.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Pokorney Mfg. Co., Chicago, Ill.
●Powell Co., Wm., The, Cincinnati, O.
Preferred Utilities Mfg. Corp., New York, N. Y.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Ruggles-Klingemann Mfg. Co., Boston, Mass. (Bleeder type)
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Shank Co., Cyrus, Chicago, Ill.
Smolensky Valve Co., Inc., Bedford, O.
Stockham Valves & Fittings, Birmingham, Ala.
Stokes Molded Products, Inc., Trenton, N. J. (Hard rubber)
●Strong, Carlisle & Hammond Co., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.
White Flomatic Corp., Hoosick Falls, N. Y.
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Gauge Co., The, Pittsburgh, Pa. (Noiseless)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, COMPRESSOR

Baker Refrigeration Corp., South Windham, Me.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Detroit Stamping Co., Detroit, Mich.
Durabla Mfg. Co., New York, N. Y.
Electric Sprayit Co., The, Sheboygan, Wis.
●Frick Co., Waynesboro, Pa.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
OPW Corp., Cincinnati, O.
Ohio Injector Co., Wadsworth, O.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Voss Co., J. H. H., Inc., New York, N. Y.

VALVES, DIAPHRAGM

American Hard Rubber Co., New York, N. Y. (Rubber lined)
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bristol Co., The, Waterbury, Conn.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
●Eclipse Fuel Engineering Co., Rockford, Ill.
Farris Engineering Corp., Palisades Park, N. J.
Fischer & Porter Co., Hatboro, Pa.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Foxboro Co., Foxboro, Mass.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware & porcelain)
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
●Grinnell Co., Providence, R. I.

Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
●Henry Valve Co., Melrose Park, Ill.
Hills-McCanna Co., Chicago, Ill.
Hubbell Corp., Mundelein, Ill.
Hunt & Son, Inc., C. B., Salem, O.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
●Leslie Co., Lyndhurst, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
McRae Valve Co., Los Angeles, Calif.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia
●Mueller Brass Co., Port Huron, Mich.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●National Radiator Co., The, Johnstown, Pa.
Norgren Co., C. A., Englewood, Colo.
North American Mfg. Co., Cleveland, O.
Norwalk Valve Co., South Norwalk, Conn.
Parks-Cramer Co., Fitchburg, Mass.
Paul Valve Corp., New York, N. Y.
Penn Industrial Equipment Corp., Philadelphia, Pa.
Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Skokie, Ill. (also packless)
R-S Products Corp., Philadelphia, Pa.
Ross Valve Mfg. Co., Inc., Troy, N. J.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Saran Lined Pipe Co., Ferndale, Mich. (Saran lined)
Schade Valve Mfg. Co., Philadelphia, Pa.
●Spence Engineering Co., Inc., Walden, N. Y.
Staples & Pfeiffer, San Francisco, Calif.
●Swartwout Co., Cleveland, O.
Taglabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
●Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
United States Rubber Co., New York, N. Y.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.

VALVES, FIRE PROTECTION, SPRINKLER SYSTEM CONTROL

Barber-Colman Co., Rockford, Ill.
●Crane Co., Chicago, Ill.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hodgman Mfg. Co., Taunton, Mass.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
McRae Valve Co., Los Angeles, Calif.
Ohio Injector Co., Wadsworth, O.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwood Sprinkler Co., Worcester, Mass.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.

VALVES, FLOAT

A-P Controls Corp., Milwaukee, Wis. (Oil)
●Alco Valve Co., St. Louis, Mo.
American Hard Rubber Co., New York, N. Y. (Hard rubber)
American Moistening Co., Providence, R. I.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Beckett & Co., Inc., Thomas, Dallas, Tex.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Caldwell Co., W. E., Louisville, Ky.
●Cash Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Cleveland Humidifier Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Frick Co., Waynesboro, Pa.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Locke Regulator Co., Salem, Mass.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
●Maid-O'-Mist, Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Industrial Div., Phialdelphia, Pa.
Monash-Younker Co., Chicago, Ill.
Morey, Dan, Los Angeles, Calif.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Perfex Corp., Milwaukee, Wis.
Phillips & Co., H. A., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Robert Mfg. Co., Los Angeles, Calif.
Rockwell Co., W. S., Fairfield, Conn.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Shade Valve Mfg. Co., Philadelphia, Pa.
Schaub Engineering Co., Fred H., Chicago, Ill.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Scoville Mfg. Co., Waterville Div., Waterville, Conn.
●Spence Engineering Co., Inc., Walden, N. Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
●Swartwout Co., Cleveland, O.
Viking Air Conditioning Corp., Cleveland, O.
Watts Regulator Co., Lawrence, Mass.
Whittington Pump & Engineering Corp., Indianapolis, Ind.

VALVES, FLOW CONTROL, FOR HOT WATER HEATING SYSTEMS

Barber-Colman Co., Rockford, Ill.
●Bell & Gossett Co., Morton Grove, Ill.
General Controls Co., Glendale, Calif.
General Heaters & Regulators Co., Chicago, Ill.
Hammel-Dahl Co., Providence, R. I.
●Illinois Engineering Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Quality Specialty Co., Inc., Philadelphia, Pa.
Sall Bros. Co., Rockford, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●Webster & Co., Warren, Camden, N. J.
White Flomatic Corp., Hoosick Falls, N. Y.

VALVES, FORGED STEEL

American Meter Co., Inc., New York, N. Y.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Edward Valves, Inc., East Chicago, Ind.
Farris Engineering Corp., Palisades Park, N. J.
Grove Regulator Co., Oakland, Calif.
●Henry Valve Co., Melrose Park, Ill.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Ohio Injector Co., Wadsworth, O.
Paul Valve Corp., New York, N. Y.
Penberthy Injector Co., Detroit, Mich.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
R-S Products Corp., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.
Watson-Stillman Co., Roselle, N. J.

VALVES, GATE, ALLOY

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., The, Hillside, N. J.

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●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Edward Valves, Inc., East Chicago, Ind.
Electric Steel Foundry Co., Portland, Ore.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Jenkins Bros., New York, N. Y.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Milwaukee Valve Co., Milwaukee, Wis.
Ohio Injector Co., Wadsworth, O.
●Powell Co., Wm., Cincinnati, O.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, GATE, BRASS AND BRONZE

Belknap Mfg. Co., Bridgeport, Conn.
Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Eddy Valve Co., Waterford, N. Y.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
Hammond Brass Wks., Hammond, Ind.
Hinderliter Tool Co., The, Div. of H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div., H. K. Porter & Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Tin lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Milwaukee Valve Co., Milwaukee, Wis.
Morrison Brothers Co., Dubuque, Ia.
Northern Indiana Brass Co., Elkhart, Ind.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Schaible Co., The, Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GATE, IRON BODY

Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Mueller Co., Decatur, Ill.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Scott Valve Mfg. Co., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Valve Co., D. T., Div. of The, Schaible Co., Cincinnati, O.

VALVES, GATE, MALLEABLE IRON

Bordo Co., Inc., L. J., Glenside, Pa
●Crane Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

VALVES, GATE, STEEL

Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
De Zurik Shower Co., Sartell, Minn.
Edward Valves, East Chicago, Ind.
Everlasting Valve Co., Jersey City, N. J.
Hamer Oil Tool Co., Long Beach, Calif.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lead Lined Iron Pipe Co., Wakefield, Mass. (lead lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Ohio Injector Co., Wadsworth, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, GLOBE, ALLOY

Alloy Steel Products Co., Linden, N. J.
Carpenter Mfg. Corp., The, Cleveland, O.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Edward Valves, Inc., East Chicago, Ind.
Electric Steel Foundry Co., Portland, Ore.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Henry Valve Co., Melrose Park, Ill.
●Jenkins Bros., New York, N. Y.
Klingerit, Inc., New York, N. Y.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Milwaukee Valve Co., Milwaukee, Wis.
Ohio Injector Co., Wadsworth, O.
●Powell Co., Wm., Cincinnati, O.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GLOBE, BRASS AND BRONZE

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Bowser, Inc., Fort Wayne, Ind.
California Brass Mfg. Co., Los Angeles, Calif.
Carpenter Mfg. Corp., The, Cleveland, O.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., The, Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Fairbanks Co., New York, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hammond Brass Wks., Hammond, Ind.
●Henry Valve Co., Melrose Park, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div. of H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Klingerit, Inc., New York, N. Y.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
●Marsh Heating Equipment Co., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Morse-Smith-Morse, Inc., Watertown, Mass.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwood Sprinkler Co., Worcester, Mass.
Scott Valve Mfg. Co., Detroit, Mich.
Stockham Valves & Fittings, Birmingham, Ala.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Walworth Co., New York, N. Y.
White Flomatic Corp., Hoosick Falls, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GLOBE, IRON BODY

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadephia, Pa.

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●Crane Co., Chicago, Ill.
●Fairbanks Co., New York, N. Y.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Klingerit, Inc., New York, N. Y.
Lunkenheimer Co., Cincinnati, O.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Shank Co., Cyrus, Chicago, Ill.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GLOBE, MALLEABLE IRON

●Crane Co., Chicago, Ill.
●Powell Co., Wm., Cincinnati, O.
●Walworth Co., New York, N. Y.

VALVES, GLOBE, STEEL

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
●Crane Co., Chicago, Ill.
De Zurik Shower Co., Sartell, Minn.
Edward Valves, Inc., East Chicago, Ind.
Grove Regulator Co., Oakland, Calif.
●Henry Valve Co., Melrose Park, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Klingerit, Inc., New York, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwood Sprinkler Co., Worcester, Mass.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Shank Co., Cyrus, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

VALVES, INSTRUMENT

Bristol Co., The, Waterbury, Conn.
Edward Valves, Inc., East Chicago, Ind.
Hasco Valve & Machine Co., Milwaukee, Wis.
Hills-McCanna Co., Chicago, Ill.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Penberthy Injector Co., Detroit, Mich.
Warren Engineering Co., Broadway, N. J.
Watts Regulator Co., Lawrence, Mass.

VALVES, LINED

American Hard Rubber Co., New York, N. Y. (Rubber lined)
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
De Zurik Shower Co., Sartell, Minn.
Division Lead Co., Chicago, Ill.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
●General Controls Co., Glendale, Calif.
Goodrich Co., B. F., Akron, O. (Rubber lined)
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis. (Rubber)
Hills-McCanna Co., Chicago, Ill.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
National Lead Co., New York, N. Y. (Lead)
Paul Valve Corp., New York, N. Y.
R-S Products Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (Lead)
Rockwell Co., W. S., Fairfield, Conn.
Rockwell Mfg. Co., Meter and Valve Div., Pittsburgh, Pa.
Saran Lined Pipe Co., Ferndale, Mich. (Saran lined)
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.

VALVES, MIXING, HOT AND COLD WATER

Bailey Co., Chas. M., San Francisco, Calif.
●Bell & Gossett Co., Morton Grove, Ill.
●Crane Co., Chicago, Ill.
●Dole Valve Co., The, Chicago, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Fittings Co., Providence, R. I.
Holby Valve Co., New York, N. Y.
Lawler Automatic Controls, Inc., Mount Vernon, N. Y.
Leonard Valve Co., Cranston, R. I.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
●Taco Heaters, Inc., Providence, R. I.
Vapor Heating Corp., Chicago, Ill.
Watts Regulator Co., Lawrenceville, Mass.
●Webster & Co., Warren, Camden, N. J.
Yula Water Heaters Inc., New York, N. Y.

VALVES, MIXING, STEAM AND WATER

Central Brass Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Hammel-Dahl Co., Providence, R. I.
●Johnson Service Co., Milwaukee, Wis.
Leonard Valve Co., Cranston, R. I.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Powers Regulator Co., Skokie, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls Inc., New York, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.

VALVES, MOTOR OPERATED

Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
●Bell & Gossett Co., Morton Grove, Ill.
Bristol Co., The, Waterbury, Conn.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cochrane Corp., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
●General Controls Co., Glendale, Calif.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Hasco Valve & Machine Co., Milwaukee, Wis.
Hills-McCanna Co., Chicago, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Homestead Valve Mfg. Co., Coraopolis, Pa.
●Illinois Engineering Co., Chicago, Ill.
J O Mfg. Co., South Gate, Calif.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kieley & Mueller, Inc., North Bergen, N. J.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Mason-Neilan Regulator Co., Boston, Mass.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Nordstrom Valve Div., Rockwell Mfg. Co., Pittsburgh, Pa.
North American Mfg. Co., Cleveland, O.
Paul Valve Corp., New York, N. Y.
●Penn Controls, Inc., Goshen, Ind.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
●Powell Co., Wm., Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Rockwell Co., W. S., Fairfield, Conn.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.

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Stockham Valves & Fittings, Birmingham, Ala.
Tagliabue Instruments Div., Weston Electrical Instrument Corp. Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, NEEDLE

A-P Controls Corp., Milwaukee, Wis. (Oil)
Alloy Steel Products Co., Linden, N. J. (Stainless steel)
American Meter Co., Inc., New York, N. Y.
Carpenter Mfg. Corp., The, Cleveland, O. (Stainless steel stem, brass bar stock body)
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Lunkenheimer Co., Cincinnati, O.
●Maid-O'-Mist, Inc., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Morrison Brothers Co., Dubuque, Ia.
Norgren Co., C. A., Englewood, Colo.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Patrol Valve Co., The, Cleveland, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Sarco Co., Inc., New York, N. Y.
Shank Co., Cyrus, Chicago, Ill.
Stockham Valves & Fittings, Birmingham, Ala.
Strong, Carlisle & Hammond Co., Cleveland, O.
Superior Controls Co., Inc., Los Angeles, Calif.
Swift Lubricator Co., Elmira, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J. (Hydraulic service)
Weatherhead Co., The, Cleveland, O.
Webster Electric Co., Racine, Wis. (Pressure regulating valve for oil burners)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, PLASTIC

American Agile Corp., Cleveland, O.
General Ceramics & Steatite Corp., Keasbey, N. J.
Haveg Corp., Newark, Del.
Saran Lined Pipe Co., Ferndale, Mich.

VALVES, PLUG

Altens Foundry & Machine Works, Inc., Lancaster, O.
American Car & Foundry Co., New York, N. Y.
Andale Co., Philadelphia, Pa.
Barrett, Haentjens & Co., Hazleton, Pa.
Barrett Machine Co., Pittsburgh, Pa.
Belfield Valve, Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bordo Co., Inc., L. J., Glenside, Pa.
Carpenter Mfg. Corp., The, Cleveland, O.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
Couplings Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
De Zurik Shower Co., Sartell, Minn. (rubber faced)
Duriron Co., Inc., Dayton, O. (Acid resisting)
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware & porcelain)
Gilbert Brass Foundry Co., St. Louis, Mo.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Hamer Oil Tool Co., Long Beach, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Klingerit, Inc., New York, N. Y.
Knight, Maurice A., Akron, O. (Stoneware)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Mueller Co., Decatur, Ill.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Nordstrom Valve Div., Rockwell Mfg. Co., Pittsburgh, Pa. (Lubricated)
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Parks-Cramer Co., Fitchburg, Mass. (jacketed)
Pittsburgh Brass Mfg. Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
R-S Products Corp., Philadelphia, Pa.
Reynolds Shaffer Co., Detroit, Mich.
Saran Lined Pipe Co., Ferndale, Mich. (Saran lined)
Stockham Valves & Fittings, Birmingham, Ala.
●Taylor Instrument Companies, Rochester, N. Y.
Tri-Clover Machine Co., Kenosha, Wis.
●Walworth Co., New York, N. Y.
Weatherhead Co., The, Cleveland, O.
Wedgeplug Valve Co., Inc., New Orleans, La.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, PRESSURE REDUCING AND REGULATING, AIR AND GAS

Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bellows Co., Akron, O.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Boylston Steam Specialty Co., Chicago, Ill.
CCA Products, Inc., Glendale, Calif.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument & Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
DeVilbiss Co., The, Toledo, O.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Gold Top Heating, Inc., Butte, Mont.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
Harris Calorific Co., The, Cleveland, O.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Hoffman Specialty Co., Indianapolis, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Liquid Carbonic Corp., The, Chicago, Ill.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Englewood, Colo.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.

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Norwalk Valve Co., South Norwalk, Conn.
●Penn Controls, Inc., Goshen, Ind.
●Powers Regulator Co., Skokie, Ill.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
●Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
●Thrush & Co., H. A., Peru, Ind.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Tryco Products, Inc., Westfield, Mass.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

VALVES, PRESSURE REDUCING AND REGULATING, HOT WATER

Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Boylston Steam Specialty Co., Chicago, Ill.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Powers Regulator Co., Skokie, Ill.
Republic Flow Meters Co., Chicago, Ill.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schaible Co., The, Cincinnati, O.
●Spence Engineering Co., Inc., Walden, N .Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Tagliabue Instruments Div. Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
White Flomatic Corp., Hoosick Falls, N. Y.

VALVES, PRESSURE REDUCING AND REGULATING, STEAM

American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Dunham Co., C. A., Chicago, Ill.
●Fischer Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
●Powers Regulator Co., Skokie, Ill.
Republic Flow Meters Co., Chicago, Ill.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Tagliabue Corp., C. J., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Warren Engineering Co., Broadway, N. J.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

VALVES, PUMP

Anchor Packing Co., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
Dick Co., Inc., R. & J., Passaic, N. J.
Durabla Mfg. Co., New York, N. Y.
Garlock Packing Co, Palmyra, N. Y.
Goodrich Co., B. F., Akron, O.
Jacuzzi Bros., Inc., Richmond, Calif.
Madden & Co., P. E., Chicago, Ill.
Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, Pa.
Red Jacket Mfg. Co., Davenport, Ia.
United States Rubber Company, New York, N. Y.
Williams Gauge Co., The, Pittsburgh, Pa.

VALVES, RADIATOR, AIR

Anderson Products, Inc., Cambridge, Mass.
Beaton & Corbin Mfg. Co., Southington, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
●Dole Valve Co., The, Chicago, Ill.
G & H Mfg. Co., Philadelphia, Pa.
Gold Top Heating, Inc., Butte, Mont.
Gorton Heating Co., Cranford, N. J.
Heat Timer Corp., New York, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
Keeney Mfg. Co., Newington, Conn.
Little Mfg. Co., M. S., Hartford, Conn.
●Maid-O'-Mist, Inc., Chicago, Ill.
Majot Automatic Machine Co., Inc., East Orange, N. J.
McAlear Mfg. Co., Chicago, Ill.
Moreheat Distribution, Inc., Cincinnati, O.
New York Air Valve Corp., Brooklyn, N. Y.
Positive Control Co., The, Cincinnati, O.
●Powers Regulator Co., Skokie, Ill.
Radiator Valve Co. of America, Philadelphia, Pa.
Riggio Co., Frank D., Rutherford, N. J.
Schaible Co., The, Cincinnati, O.
●Taco Heaters, Inc., Providence, R. I.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, ELECTRIC

Barber-Colman Co., Rockford, Ill.

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●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
Jenkins Bros., New York, N. Y.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Sarcotherm Controls, Inc., New York, N. Y.
Vapor Heating Corp., Chicago, Ill.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, PNEUMATIC

●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Skokie, Ill. (also packless)

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, SELF-CONTAINED

●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
Majot Automatic Machine Co., Inc., East Orange, N. J.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Sterling, Inc., Milwaukee, Wis.
●Trane Co., The, LaCrosse, Wis.

VALVES, RADIATOR, ORIFICE

American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Dunham Co., C. A., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
●Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York, N. Y.
Marsh Valve Co., Dunkirk, N. Y.
New York Air Valve Corp., Brooklyn, N. Y.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Trane Co., The, LaCrosse, Wis.
●Webster & Co., Warren, Camden, N. J.

VALVES, RADIATOR, STEAM AND HOT WATER, HAND

●Barnes & Jones, Inc., Boston, Mass.
Belknap Mfg. Co., Bridgeport, Conn.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Cashin Co., W. D., Boston, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
●Crane Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
●Dunham Co., C. A., Chicago, Ill.
●Fairbanks Co., New York, N. Y.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
Hammond Brass Wks., Hammond, Ind.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
●Marsh Heating Equipment Co., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
●Powell Co., Wm., Cincinnati, O.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Squires Co., C. E., The, Cleveland, O.
●Sterling, Inc., Milwaukee, Wis.
●Trane Co., The, La Crosse, Wis.
United States Radiator Corp., Detroit, Mich.
●Webster & Co., Warren, Camden, N. J.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, RADIATOR, STEAM AND HOT WATER, MODULATING

American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Cashin Co., W. D., Boston, Mass.
Cryer Trap & Valve Co., Inc., New York, N. Y.
●Dunham Co., C. A., Chicago, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Johnson Service Co., Milwaukee, Wis.
●Marsh Heating Equipment Co., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Ohio Brass Co., Mansfield, O.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
●Sterling, Inc., Milwaukee, Wis.
Tallmadge, Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Vapor Specialty Co., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.

VALVES, REFRIGERATION (ANGLE, CHECK, GATE, GLOBE, NEEDLE, RELIEF)

Baker Refrigeration Corp., South Windham, Me.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Central Brass Mfg. Co., Cleveland, O.
●Crane Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Detroit Stamping Co., Detroit, Mich.
●Frick Co., Waynesboro, Pa.
Hammel-Dahl Co., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Shank Co., Cyrus, Chicago, Ill.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, BACK PRESSURE

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
Aminco Refrigeration Products Co., Detroit, Mich.
Bailey Co., Chas. M., San Francisco, Calif.
Baker Refrigeration Corp., South Windham, Me.
●Cash Co., A. W., Decatur, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., Skokie, Ill.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
●General Controls Co., Glendale, Calif.
Hammel-Dahl Co., Providence, R. I.
Hubbell Corp., Mundelein, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
●Marsh Heating Equipment Co., Skokie, Ill.
●Mueller Brass Co., Port Huron, Mich.
●Schnacke, Inc., Evansville, Ind.
Temprite Products Corp., Birmingham, Mich.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, EXPANSION, CONSTANT PRESSURE

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
Aminco Refrigeration Products Co., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
●Cash Co., A. W., Decatur, Ill.
●Crane Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Foster Engineering Co., Union, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
●General Controls Co., Glendale, Calif.
Hammel-Dahl Co., Providence, R. I.
Hubbell Corp., Mundelein, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
Mayson Mfg. Co., Detroit, Mich.
Tenney Engineering, Inc., Newark, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, EXPANSION, THERMOSTATIC

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
Cutler-Hammer Inc., Milwaukee, Wis.
Detroit Lubricator Co., Detroit, Mich.

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Frigidaire Div., General Motors Corp., Dayton, O.
●General Controls Co., Glendale, Calif.
Mayson Mfg. Co., Detroit, Mich.
Peerless of America, Inc., Chicago, Ill.
●Sporlan Valve Co., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
X L Refrigerating Co., Chicago, Ill.

VALVES, REFRIGERATION, FLOAT, HIGH PRESSURE

●Alco Valve Co., St. Louis, Mo.
Aminco Refrigeration Products Co., Detroit, Mich.
Foster Engineering Co., Union, N. J.
●Frick Co., Waynesboro, Pa.
Hubbell Corp., Mundelein, Ill.
●Mercoid Corp., Chicago, Ill.
Phillips & Co., H. A., Chicago, Ill.
Temprite Products Corp., Birmingham, Mich.
Vilter Mfg. Co, Milwaukee, Wis.
Wabash Mfg. Co., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

VALVES, REFRIGERATION, FLOAT, HIGH PRESSURE AND LOW PRESSURE

Aminco Refrigeration Products Co., Detroit, Mich.
Mayson Mfg. Co., Detroit, Mich.
Temprite Products Corp., Birmingham, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Voss Co., J. H. H., Inc., New York, N. Y.
York Corp., York, Pa.

VALVES, REFRIGERATION, LIQUID CONTROL, FLOAT PILOTED

●Alco Valve Co., St. Louis, Mo.
Cooper Co., Clark, Palmyra, N. J.
●Frick Co., Waynesboro, Pa.
●Maid-O'-Mist, Inc., Chicago, Ill.
Phillips & Co., H. A., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, MAGNETIC STOP

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
●Automatic Switch Co., Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., Skokie, Ill.
●Frick Co., Waynesboro, Pa.
●General Controls Co., Glendale, Calif.
Hubbell Corp., Mundelein, Ill.
●Marsh Heating Equipment Co., Skokie, Ill.
●Mercoid Corp., Chicago, Ill.
●Penn Controls, Inc., Goshen, Ind.
Skinner Electric Valve Div., Norwalk, Conn.
●Sporlan Valve Co., St. Louis, Mo.

VALVES, REFRIGERATION, TEMPERATURE REGULATING OR SNAP ACTION SUCTION

●Alco Valve Co., St. Louis, Mo.
Frigidaire Div., General Motors Corp., Dayton, O.
Temprite Products Corp., Birmingham, Mich.

VALVES, REFRIGERATION, WATER REGULATING, PRESSURE OR TEMPERATURE ACTUATED

A-P Controls Corp., Milwaukee, Wis.
Aminco Refrigeration Products Co., Detroit, Mich.
Art Valve Co., Chicago, Ill.
Bailey Co., Chas. M., San Francisco, Calif.
●Cash Co., A. W., Decatur, Ill.
Cooper Co., Clark, Palmyra, N. J.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., Skokie, Ill.
Farris Engineering Corp., Palisades Park, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
Hubbell Corp., Mundelein, Ill.
Klipfel Mfg. Co., Hamilton, O.
Madden Brass Products Co., The, Chicago, Ill.
●Marsh Heating Equipment Co., Skokie, Ill.
Mayson Mfg. Co., Detroit, Mich.
●Mercoid Corp., Chicago, Ill.
●Penn Controls, Inc., Goshen, Ind.
Perfection Refrigeration Parts Co., Harvey, Ill.
●Sarco Co., Inc., New York, N. Y.
Shank Co., Cyrus, Chicago, Ill.
●Spence Engineering Co., Inc., Walden, N. Y.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
York Corp., York, Pa.

VALVES, RELIEF, HOT WATER, COMBINED PRESSURE AND TEMPERATURE OPERATED

Beaton & Cadwell Mfg. Co., New Britain, Conn.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
●Fisher Govenor Co., Marshalltown, Ia.
Kainer & Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Patrol Valve Co., The, Cleveland, O.
Sall Bros. Co., Rockford, Ill.
Schaible Co., The, Cincinnati, O.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
●Thrush & Co., H. A. Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Watts Regulator Co., Lawrence, Mass.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.

VALVES, RELIEF, HOT WATER, PRESSURE OPERATED

Ashton Valve Co., Wrentham, Mass.
Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Durabla Mfg. Co., New York, N. Y.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Farris Engineering Corp., Palisades Park, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Kunkle Valve Co., Ft. Wayne, Ind.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Patrol Valve Co., The, Cleveland, O.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schaible Co., The, Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Staples & Pfeiffer, San Francisco, Calif.
●Swartwout Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Tryco Products, Inc., Westfield, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.

VALVES, RELIEF, HOT WATER, PRESSURE OPERATED, SELF-FILLING

Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
●Crane Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Mueller Co., Decatur, Ill.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
●Thrush & Co., H. A., Peru, Ind.
Watts Regulator Co., Lawrence, Mass.

VALVES, RELIEF, HYDRAULIC

Ashton Valve Co., Wrentham, Mass.
Atlas Valve Co., Newark, N. J.
Blackhawk Mfg. Co., Milwaukee, Wis.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Golden-Anderson Specialty Co., Pittsburgh, Pa.
Kunkle Valve Co., Ft. Wayne, Ind.

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Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Pantex Mfg. Corp., Hydraulic Div., Pawtucket, R. I.
Watson-Stillman Co., Roselle, N. J.

VALVES, RELIEF, OIL

Altens Foundry & Machine Works, Inc., Lancaster, O.
Andale Co., Philadelphia, Pa.
Ashton Valve Co., Wrentham, Mass.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Davis Regulator Corp., Chicago, Ill.
Durabla Mfg. Co., New York, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Farris Engineering Corp., Palisades Park, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hubbell Corp., Mundelein, Ill.
Keckley Co., O. C., Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Kunkle Valve Co., Ft. Wayne, Ind.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
Locke Regulator Co., Salem, Mass.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Morrison Brothers Co., Dubuque, Ia.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Pantex Mfg. Corp., Hydraulics Div., Pawtucket, R. I.
Preferred Utilites Mfg. Corp., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Skinner Electric Valve Div., Norwalk, Conn.
Staples & Pfeiffer, San Francisco, Calif.
Thermix Corp., The, Greenwich, Conn.
Watson & McDaniel Co., Philadelphia, Pa.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, SADDLE

Beckett & Co., Inc., Thomas, Dallas, Tex.
Chicago Specialty Mfg. Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
●Fairbanks Co., New York, N. Y.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Maid-O'-Mist, Inc., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Ohio Injector Co., Wadsworth, O.
●Walworth Co., New York, N. Y.

VALVES, SAFETY CLEANOUT

Petrometer Corp., Long Island City, N. Y.

VALVES, SAFETY, STEAM

Ashton Valve Co., Wrentham, Mass.
Chicago Specialty Mfg. Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Farris Engineering Corp., Palisades Park, N. J.
Foster Engineering Co., Union, N. J.
Keckley Co., O. C., Chicago, Ill.
Kunkle Valve Co., Ft. Wayne, Ind.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Stratford, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
North American Mfg. Co., Cleveland, O.
●Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

VALVES, SLIDE

Altens Foundry & Machine Works, Inc., Lancaster, O.
Barksdale Valves, Los Angeles, Calif.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
General Ceramics & Steatite Corp., Keasbey, N. J. (chemical stoneware)
J O Mfg. Co., South Gate, Calif.
Morganite, Inc., Carbon Specialties Div., Long Island City, N. Y.
Ohio Injector Co., Wadsworth, O.
R-S Products Corp., Philadelphia, Pa.
Rockwell Co., W. S., Fairfield, Conn.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, SOLDER JOINT

American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., The, Cleveland, O.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
●Fairbanks Co., New York, N. Y. (Silver braze joints)
Hammond Brass Works, Hammond, Ind.
●Henry Valve Co., Melrose Park, Ill.
Hills-McCanna Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
●Ohio Brass Co., Mansfield, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Powell Co., Wm., Cincinnati, O.
R-P & C Valve Div., Reading, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
●Walworth Co., New York, N. Y. (Brazed)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, SOLENOID

●Alco Valve Co., St. Louis, Mo.
Automatic Products Co., Milwaukee, Wis.
●Automatic Switch Co., Orange, N. J.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
Bellows Co., Akron, O.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., Skokie, Ill.
Erickson Specialty Co., Cohoes, N. Y.
●Frick Co., Waynesboro, Pa.
●General Controls Co., Glendale, Calif.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gleason-Avery, Inc., Auburn, N. Y.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
Hays Mfg. Co., Erie, Pa.
Hook & Ackerman, Inc., New York, N. Y.
Hubbell Corp., Mundelein, Ill.
Hunt & Son, Inc., C. B., Salem, O.
Johnson Corp., The, Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Lammert & Mann Co., Chicago, Ill. (Gas safety shut-off)
Locke Regulator Co., Salem, Mass.
●Marsh Heating Equipment Co., Skokie, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
McQuay-Norris Mfg. Co., St. Louis, Mo.
McRae Valve Co., Los Angeles, Calif.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Paul Valve Corp., New York, N. Y.
●Penn Controls, Inc., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Pfening Co., Fred D., Columbus, O. (water and steam)
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Skinner Electric Valve Div., Norwalk, Conn.
●Sporlan Valve Co., St. Louis, Mo.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Superior Controls Co., Inc., Los Angeles, Calif.
Supreme Electric Products Corp., Rochester, N. Y.
Taylor-Winfield Corp., Warren, O.
Vapor Heating Corp., Chicago, Ill.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
●White-Rodgers Electric Co., St. Louis, Mo.

VALVES, 2, 3 AND 4 WAY

●Alco Valve Co., St. Louis, Mo.
Altens Foundry & Machine Works, Inc., Lancaster, O.
American Car & Foundry Co., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bellows Co., Akron, O.

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Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bordo Co., Inc., L. J., Glenside, Pa.
Bristol Co., The, Waterbury, Conn.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Clark Controller Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
●Davis Engineering Corp., Elizabeth, N. J.
Davis Regulator Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
De Zurik Shower Co., Sartell, Minn.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
●Fisher Governor Co., Marshalltown, Ia.
●General Controls Co., Glendale, Calif.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hunt & Son, Inc., C. B., Salem, O.
Imperial Brass Mfg. Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Keller Tool Co., Grand Haven, Mich.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lawler Automatic Controls, Inc., Mount Vernon, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Nordstrom Valve Div., Rockwell Mfg. Co., Pittsburgh, Pa.
●Penn Controls, Inc., Goshen, Ind.
●Powell Co., Wm., Cincinnati, O.
●Powers Regulator Co., Skokie, Ill.
R-S Products Corp., Philadelphia, Pa.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwell Co., W. S., Fairfeld, Conn.
Rockwell Mfg. Co., Meter and Valve Div., Pittsburgh, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Shank Co., Cyrus, Chicago, Ill.
Skinner Electric Valve Div., Norwalk, Conn.
●Spence Engineering Co., Inc., Walden, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Taylor-Winfield Corp., Warren, O.
●Walworth Co., New York, N. Y. (Lubricated plug valves)
Warren Engineering Co., Broadway, N. J.
Watson-Stillman Co., Roselle, N. J. (Hydraulic service)
Weatherhead Co., The, Cleveland, O.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Whittaker Co., Wm. R., Los Angeles, Calif.

VANES, DUCT TURNING, PREFABRICATED

●Anemostat Corp. of America, New York, N. Y. (Equalizing deflectors)
Barber-Colman Co., Rockford, Ill.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
●Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
●Titus Mfg. Corp., Waterloo, Ia.
●Tuttle & Bailey, Inc., New Britain, Conn.

VAPOR HEATING SYSTEMS

See Systems, Heating, Vapor

VARIABLE SPEED DRIVES

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical; Reducers, Speed; Pulleys and Sheaves, for Belt Drives

VARIABLE SPEED PULLEYS

See Changers, Speed, Mechanical

V-BELT DRIVES

See Drives, V-Belt

VELOCITY REGULATORS

See Regulators, Air Velocity

VENT FLUE CAPS

See Caps, Vent Flue

VENTILATING HOSE

See Ducts and Duct Fittings, Prefabricated, Non-Metallic

VENTILATION HEATERS

See Surface, Finned, Heating; Ventilators, Roof, Fan; Ventilators, Unit

VENTILATORS, MUSHROOM

●Chicago Blower Corp., Chicago, Ill.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dickinson, Aeolus, Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Knight, Maurice A., Akron, O. (Stoneware)
Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Lumm Co., A. H., Toledo, O.
Penn Ventilating Co., Philadelphia, Pa.
Van Noorden Co., E., Boston, Mass.

VENTILATORS, ROOF, FAN

Acme Equipment Co., Muskogee, Okla.
Aerovent Fan Co., Inc., Piqua, O.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Airecon Industries, Detroit, Mich.
Allen Ventilator Div., Production Planning Co., Rochester, Minn.
American Coolair Corp., Jacksonville, Fla.
American-Larson Ventilation Co., Pittsburgh, Pa.
American Steel Band Co., Pittsburgh, Pa.
Ammerman Co., C. L., Minneapolis, Minn.
Arex Co., Chicago, Ill.
Bar-Brook Mfg. Co., Inc., Shreveport, La.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Breidert Co., G. C., Los Angeles, Calif.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
●Chicago Blower Corp., Chicago, Ill.
Clay Equipment Corp., Cedar Falls, Ia.
Dana Fan & Blower Corp., Cincinnati, O.
Davidson Hyduty Roof Fan Co., Newton, Mass.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dickinson, Aeolus, Chicago, Ill.
Diehl Mfg. Co., Somerville, N. J.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Empire Ventilation Equipment Co., Long Island City, N. Y.
●Gallaher Co., The, Owatonna, Minn., & Omaha, Neb.
Gehri Co., Tacoma, Wash.
●General Blower Co., Morton Grove, Ill.
Hartzell Propeller Fan Co., Piqua, O.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Howes-Woods Co., Cambridge, Mass.
Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
Iona Ventilator Co., Inc., Philadelphia, Pa.
Iron Lung Ventilator Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
●Jenn Air Products Co., Indianapolis, Ind.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Lee & Son Co., Thomas, Cincinnati, O.
Lumm Co., A. H., Toledo, O.
Martin Fan & Blower Co., Chicago, Ill.
Mellish & Murray Co., Chicago, Ill.
Mountain States Equipment Co., Denver, Colo.
●Muckle Mfg. Co., Owatonna, Minn.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●New York Blower Co., Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Octagon Ventilator Co., Chicago, Ill.
Paasche Airbrush Co., Chicago, Ill.
Peerless Electric Co., Warren, O.
Penn Ventilating Co., Philadelphia, Pa.
Phoenix Ventilator Co., Inc., Brooklyn, N. Y.
●Propellair Div., Robbins & Myers Inc., Springfield, O.
Robertson Co., H. H., Pittsburgh, Pa.
Royal Ventilator Co., Philadelphia, Pa.
Somers, Inc., H. J., Detroit, Mich.
●South Bend Air Products, Inc., South Bend, Ind.
●Swartwout Co., Cleveland, O.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
●Trane Co., The, La Crosse, Wis.
Truflo Fan Co., Harmony, Pa.
Uno Ventilator Co., Malden, Mass.
●Utility Appliance Corp., Los Angeles, Calif.
Van Noorden Co., E., Boston, Mass.
Washburne & Co., E. G., New York, N. Y.
Waverly Heating Supply Co., Boston, Mass.
●Western Engineering & Mfg. Co., Los Angeles, Calif.
Wind-Way Fan & Ventilator Co., New Orleans, La.
●Wing Mfg. Co., L. J., Linden, N. J.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.

VENTILATORS, ROOF, GRAVITY

Accurate Sheet Metal Mfg. Works, Chicago, Ill.
Air Control Products, Inc., Coopersville, Mich.
●Air Devices, Inc., New York, N. Y.
Airecon Industries, Detroit, Mich.
Airjet Ventilator Co., Pasadena, Calif.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
Allen Ventilator Div., Production Planning Co., Rochester, Mich.
American-Larson Ventilation Co., Pittsburgh, Pa.
American Sheet Metal Works, New Orleans, La.
American Steel Band Co., Pittsburgh, Pa.
Ammerman Co., C. L., Minneapolis, Minn.

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Arex Co., Chicago, Ill.
Autoforce Ventilating System, Boston, Mass.
Breidert Co., G. C., Los Angeles, Calif.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
Clay Equipment Corp., Cedar Falls, Ia.
Danzer Metal Works Co., Hagerstown, Md.
Day Co., The, Minneapolis, Minn.
Dickinson, Aeolus, Chicago, Ill.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Gehri Co., Tacoma, Wash.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Howes-Woods Co., Cambridge, Mass.
Inland Steel Products Co., Milwaukee, Wis.
Iona Ventilator Co., Inc., Philadelphia, Pa.
Iwan Brothers, South Bend, Ind.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Klauer Mfg. Co., Dubuque, Ia.
Kleenaire Corp., Stevens Point, Wis.
La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.
Lee & Son Co., Thomas, Cincinnati, O.
Levow, David, New York, N. Y.
Lumm Co., A. H., Toledo, O.
Lyon, Conklin & Co., Inc., Baltimore, Md.
Mellish & Murray Co., Chicago, Ill.
Moeschl-Edwards Corrugating Co., Inc., The, Cincinnati, O.
National Metal Fabricators, Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Octagon Ventilator Co., Chicago, Ill.
Patten Co., J. V., Sycamore, Ill.
Penn Ventilating Co., Philadelphia, Pa.
Phoenix Ventilator Co., Inc., Brooklyn, N. Y.
Pioneer Roofing & Sheet Metal Co., Muskogee, Okla.
Plasteel Products Co., Washington, Pa.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Riggin Metal Products, Inc., Kankakee, Ill.
Robertson Co., H. H., Pittsburgh, Pa.
Royal Ventilator Co., Philadelphia, Pa.
St. Paul Corrugating Co., St. Paul, Minn.
Sioux Steel Co., Sioux Falls, S. D.
Southbridge Roofing Co., Inc., Southbridge, Mass.
Souther Iron Co., E. E., St. Louis, Mo.
Southern States Iron Roofing Co., Savannah, Ga.
Standard Furnace Supply Co., Omaha, Neb.
Standard Ventilator Co., Lewisburg, Pa.
●Swartwout Co., Cleveland, O.
Tierney Rotor Ventilator Co., Minneapolis, Minn.
Tiffin Eaves Trough Co., Tiffin, O.
Uno Ventilator Co., Malden, Mass.
Van Noorden Co., E., Boston, Mass.
Walker Jamar Co., Duluth, Minn.
Warner Ventilator Co., La Grange, Ind.
Waverly Heating Supply Co., Boston, Mass.
●Western Engineering & Mfg. Co., Los Angeles, Calif.
Willis Steel Corp., Galesburg, Ill.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
York Corrugating Co., York, Pa.

VENTILATORS, UNIT

●American Blower Corp., Detroit, Mich.
●Bayley Blower Corp., Milwaukee, Wis.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Gannon Co., Russell R., Co., Inc., The, Cincinnati, O.
●Nelson Herman Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
●Trane Co., The, LaCrosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

VIBRATION ISOLATORS

See Absorbers, Vibration; Bases and Pads, Vibration Isolating; Hose, Metal and Fittings

VISCOSIMETERS

American Instrument Co., Silver Spring, Md.
Brabender Corp., Rochelle Park, N. J.
Bristol Co., The, Waterbury, Conn.
Brookfield Engineering Laboratories, Inc., Stoughton, Mass.
Daigger & Co., A., Chicago, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
Fischer & Porter Co., Hatboro, Pa.
Fish-Schurman Corp., New York, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Greiner Co., Emil, New York, N. Y.
Humboldt Mfg. Co., Chicago, Ill.
Precision Scientific Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Thomas Co., Arthur H., Philadelphia, Pa.
Will Corp., Rochester, N. Y.

VISES, PIPE

American Implement Co., Omaha, Neb.
American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Beaver Pipe Tools, Inc., Warren, O. (Sawing—for tubing)
Billings & Spencer Co., Hartford, Conn.
Capewell Mfg. Co., Hartford, Conn.
Crown Die & Tool Co., Chicago, Ill.
Desmond-Stephens Mfg. Co., Urbana, O.
Erie Tool Wks., Erie, Pa.
Hollands Mfg. Co., Erie, Pa.
Lowell Wrench Co., Worcester, Mass.
Munton Mfg. Co., Franklin Park, Ill.
Nye Tool Co., Chicago, Ill.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Toledo Pipe Threading Machine Co., Toledo, O.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Vanderman Mfg. Co., Willimantic, Conn.
Williams & Co., J. H., Buffalo, N. Y.
Yost Mfg. Co., Meadville, Pa.

WASHERS, AIR

●Air & Refrigeration Corp., New York, N. Y.
Airwasher Corp., Lansing, Mich.
Alton Mfg. Co., Dallas, Tex.
●American Blower Corp., Detroit, Mich.
Bahnson Co., Winston-Salem, N. C.
●Bayley Blower Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blower Application Co., Milwaukee, Wis.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
●Carrier Corp., Syracuse, N. Y.
Centri-Spray Corp., Detroit, Mich. (Wet type)
●Clarage Fan Co., Kalamazoo, Mich.
Columbus Heating & Ventilating Co., Columbus, O.
Comfort Products Corp., Dallas, Tex.
●Continental Air Filters, Inc., Louisville, Ky.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kennard Corp., St. Louis, Mo. (sprayed coil dehumidifiers)
Lehigh Fan & Blower Co., Allentown, Pa.
●Marlo Coil Co., St. Louis, Mo.
Mellish & Murray Co., Chicago, Ill.
Mountain States Equipment Co., Denver, Colo.
Murray Mfg. Co., D. J., Wausau, Wis.
Parks-Cramer Co., Fitchburg, Mass.
Peters-Dalton, Inc., Detroit, Mich.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
Schmieg Industries, Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
Strandwitz & Co., Inc., W. J., Camden, N. J.
●Surface Combustion Corp., Toledo, O.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Utility Appliance Corp., Los Angeles, Calif.
Vilter Mfg. Co., Milwaukee, Wis.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
York Corp., York, Pa.

WASHERS, FUME

Ducon Co., Mineola, N. Y.
Knight, Maurice A., Akron, Ohio

WATER TREATMENT

See Treatment, Water, to Inhibit Corrosion; Devices, Electrolytic, for Preventing Corrosion

WELD TESTING MACHINES

See Machines, Testing, Weld

WELDERS, ARC

Air Reduction Sales Co., New York, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Birdsell Mfg. Co., Inc., Palo Alto, Calif.
Borm Mfg. Co., Elgin, Ill.
Eisler Engineering Co., Inc., Newark, N. J.
Electric Arc, Inc., Newark, N. J.
Ergolyte Mfg. Co., Philadelphia, Pa.
Eutectic Welding Alloys Corp., New York, N. Y.
Fern, Ralph, Scranton, Pa.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Glenn-Roberts Co., Inc., Indianapolis, Ind.
Greyhound A. C. Arc Welder Corp., Brooklyn, N. Y.
Hammett Electric Mfg. Co., Kansas City, Mo.
Hampton Electric Mfg. Co., Pittsburgh, Pa.
Harnischfeger Corp., Milwaukee, Wis.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Hobart Bros. Co., Troy, O.
Kern Co., John A., Chicago, Ill.

● Advertisement in this issue. See Index to Advertisers, page 128d

Lee Co., K. O., Aberdeen, S. D.
Lincoln Electric Co., Cleveland, O.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y. (Inert gas-shielded)
Marquette Mfg. Co., Minneapolis, Minn.
Metal & Thermit Corp., New York, N. Y.
Mid-States Welder Mfg. Co., Chicago, Ill.
Miller Electric Mfg. Co., Inc., Appleton, Wis.
National Cylinder Gas Co., Chicago, Ill.
Niagara Machine & Tool Wks., Buffalo, N. Y.
Smith Corp., A. O., Milwaukee, Wis.
Smith Welding Equipment Corp., Minneapolis, Minn.
Trindle Products, Ltd., Chicago, Ill.
Tweco Products Co., Wichita, Kan. (Cable connectors, electrode holders and accessories)
Welding Apparatus Co., Chicago, Ill.
Westinghouse Electric Corp., Pittsburgh, Pa.
Will-Weld Mfg. Co., Inc., Omaha, Neb.
Wilson Welder & Metals Co., Inc., New York, N. Y.

WELDERS, SPOT

Acme Electric Welder Co., Los Angeles, Calif.
Acro Welder Mfg. Co., Milwaukee, Wis.
Agnew Electric Co., Milford, Mich.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Alphil Spot Welding Co., Brooklyn, N. Y.
Birdsell Mfg. Co., Inc., Palo Alto, Calif.
Doall Co., The, Des Plaines, Ill.
Eisler Engineering Co., Inc., Newark, N. J.
Electric Arc, Inc., Newark, N. J.
Federal Machine & Welder Co., The, Warren, O.
Fern, Ralph, Scranton, Pa.
Greyhound A. C. Arc Welder Corp., Brooklyn, N. Y.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y. (Inert gas-shielded arc)
Marquette Mfg. Co., Minneapolis, Minn.
Micro Products Co., Chicago, Ill.
Mid-States Welder Mfg. Co., Chicago, Ill.
Miller Electric Mfg. Co., Inc., Appleton, Wis.
Peer, Inc., Benton Harbor, Mich.
Precision Welder & Machine Co., Cincinnati, O.
Rex Welder & Engineering Co., Kansas City, Mo.
Sciaky Bros., Inc., Chicago, Ill.
Taylor-Winfield Corp., Warren, O.
Thomson Electric Welder Co., Lynn, Mass.
Universal Power Corp., Cleveland, O.
Weldex, Inc., Detroit, Mich.

WELDERS, STUD

Federal Machine & Welder Co., The, Warren, O.
Nelson Stud Welding, Div. of Morton Gregory Corp., Lorain, O.
Powder Power Tool Corp., Portland, Ore.

WELDING AND CUTTING APPARATUS, OXY-ACETYLENE

Air Reduction Sales Co., New York, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Arcos Corp., Philadelphia, Pa. (arc-oxygen)
Atlas Welding Accessories Co., Ferndale, Mich. (Weld cleaning tools)
Dockson Corp., Detroit, Mich.
Eutectic Welding Alloys Corp., New York, N. Y.
Galv-Weld Products, Lima, O. (Regalvanizing process)
General Scientific Equipment Co., Philadelphia, Pa.
Goss Gas, Inc., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.
Imperial Brass Mfg. Co., Chicago, Ill.
Industrial Gas Div., The Liquid Carbonic Corp., Chicago, Ill.
Johnson Machine Works, Eau Claire, Wis. (rotary work aligner)
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Marquette Mfg. Co., Minneapolis, Minn.
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Powder Weld Process Co., The, Brooklyn, N. Y.
Sight Feed Generator Co., West Alexandria, O. (portable and stationary acetylene generators)
Smith Welding Equipment Corp., Minneapolis, Minn.
Tru-Line Corp., Santa Monica, Calif. (Protractor for marking pipe)
Worthington Pump & Machinery Corp., Dunellen, N. J. (Welding positioner)

WELDING FUME COLLECTORS

See Exhausters, Welding Fume

WHEELS, BLOWER

Advance Aluminum Castings Corp., Chicago, Ill.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
●Bayley Blower Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Bronson Fan Mfg. Co., Los Angeles, Calif.
Burden Div., Torrington Mfg. Co., Los Angeles, Calif.
Carolina Blower Co., Inc., Greensboro, N. C.
Champion Blower & Forge Co., Lancaster Pa.
●Clarage Fan Co., Kalamazoo, Mich.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
Hastings Air Conditioning Co., Hastings, Neb.
Jaden Mfg. Co., Hastings, Neb.
●Jan Air, Inc., Richmond, Ill.
Lau Blower Co., Dayton, O.
Martin Fan & Blower Co., Chicago, Ill.
Mayne Products Co., Dayton, O.
Morrison Products, Inc., Cleveland, O.
●New York Blower Co., Chicago, Ill.
Palmer Mfg. Corp., Phoenix, Ariz.
Peerless Electric Co., Warren, O.
Revcor, Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Torrington Mfg. Co., Torrington, Conn.
Triangle Mfg. Co., Oshkosh, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Utility Appliance Corp., Los Angeles, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

WINDOWS, HEAT INSULATING

Anderson Corp., Bayport, Minn.
Chamberlin Co. of America, Detroit, Mich.
Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
Kane Mfg. Corp., Kane, Pa.
Libbey-Owens-Ford Glass Co., Toledo, O.
Mississippi Glass Co., New York, N. Y.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Russell Co., F. C., The, Cleveland, O.

WIRE, ELECTRIC, NUMBERED, FOR CONTROL SYSTEMS

●Chester Cable Corp., Chester, N. Y.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Midwest Automatic Control Co., Des Moines, Ia.

WRENCHES, PIPE

American Machine Wks., Inc., Racine, Wis.
Armstrong Bros. Tool Co., Chicago, Ill.
Bernz Co., Otto, Rochester, N. Y.
Roddick Tool Co., Anaheim, Calif.
Billings & Spencer Co., Hartford, Conn.
Bonney Forge & Tool Works, Allentown, Pa.
Clark Bros. Mfg. Co., Hillsboro, Ore.
Erie Tool Works, Erie, Pa.
Fairmount Tool & Forging, Cleveland, O.
Lowell Wrench Co., Worcester, Mass.
Nye Tool Co., Chicago, Ill.
Peck, Stow & Wilcox Co., Southington, Conn.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
●Walworth Co., New York, N. Y.

WRENCHES, RATCHET

Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Duro Metal Products Co., Chicago, Ill.
Greene, Tweed & Co., North Wales, Pa.
J O Mfg. Co., South Gate, Calif.
Lowell Wrench Co., Worcester, Mass.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
Tubing Appliance Co., Los Angeles, Calif.
William & Co., J. H., Buffalo, N. Y.

WRENCHES, TORQUE INDICATING

Ammco Tools, Inc., North Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Duro Metal Products Co., Chicago, Ill.
J O Mfg. Co., South Gate, Calif.
Richmont, Inc., San Gabriel, Calif.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
Sturtevant Co., P. A., Addison, Ill.
Williams & Co., J. H., Buffalo, N. Y.

X-RAY MACHINES AND FILM

See Machines and Film, X-Ray

ZONE CONTROLS

See Systems, Heating, Zone Control

● Advertisement in this issue. See Index to Advertisers, page 128d

DIRECTORY SECTION
HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 2—TRADE NAMES

A-B—Motor controllers. Allen-Bradley Co., Milwaukee, Wis.

ABC—Humidifiers, dust collectors, unit coolers. American Blower Corp., Detroit, Mich.

A-C—Water treatment. Elgin Softener Corp., Elgin, Ill.

ACB—Coatings. Tropical Paint & Oil Co., Cleveland, O.

A/C Range—Filters. American Air Filter Co., Inc., Louisville, Ky.

A.P.S. Plasteel—Metal sheets. Plasteel Products Co., Washington, Pa.

A.R.A.—Non-metallic sheets and board. Grant Wilson, Inc., Chicago, Ill.

ARRC—Couplings, fittings, flanges, unions. Union Metal Wks., Chelsea, Mass.

ASBO—Ventilators, louvers and shutters. American Steel Band Co., Pittsburgh, Pa.

Abrasoweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Abso-Lute—Cement and compounds. Key Co., East St. Louis, Ill.

Accordion—Insulation. Infra Insulation, Inc., New York, N. Y.

Ace—Dampers. Martens & Stormoen, Boston, Mass.

Ace—Fittings, pipe, protective coatings, pumps, tanks, valves. American Hard Rubber Co., New York, N. Y.

Ace—Welders. Peer, Inc., Benton Harbor, Mich.

Ace-Parian—Fittings, pipe. American Hard Rubber Co., New York, N. Y.

Ace-Saran—Pipe, tubing. American Hard Rubber Co., New York, N. Y.

Aco-Fin—Radiation. Airecon Industries, Detroit, Mich.

Acolite—Enamels and lacquers. Acorn Refining Co., Cleveland, O.

Acousteel—Insulation. Celotex Corp., The, Chicago, Ill.

Acousti-Celotex—Insulation. Celotex Corp., The, Chicago, Ill.

Acoustilite—Insulation. Insulite Co., Minneapolis, Minn.

Acratherm—Thermostats. Minneapolis-Honey-Well Regulator Co., Minneapolis, Minn.

Actex—Heat exchangers. Wabash Mfg. Co., Chicago, Ill.

Adamant—Furnace cement. Botfield Refractories Co., Philadelphia, Pa.

Adastic—Insulating cement. Botfield Refractories Co., Philadelphia, Pa.

Adjust-O-Feeder—Feeders, pumps, water treatment. % Proportioneers, Inc. %, Providence, R. I.

Adjustor—Heating systems. The Kehm Corp., Chicago, Ill.

Adsco—Coils, conduit, regulators, coolers, exchangers, heaters, joints, meters, pipe, pipe hangers and supports, pipe protectors, separators, sight glasses, strainers, regulators, valves. American District Steam Co., North Tonawanda, N. Y.

Adsco Dual—Traps. American District Steam Co., North Tonawanda, N. Y.

Adsco Rotary—Condensation meters. American District Steam Co., North Tonawanda, N. Y.

Aemco—Relays, switches. Automatic Electric Mfg. Co., Mankato, Minn.

Aeracool—Blades, fans, louvers and shutters. Myers Electric Co., Inc., Pittsburgh, Pa.

Aerisweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Aero—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aero—Aftercoolers, heat exchangers. Niagara Blower Co., New York, N. Y.

Aero—Radiation. National Radiator Co., The, Johnstown, Pa.

Aerodyne—Fans. Jeffrey Mfg. Co., Columbus, O.

Aero-Flex—Registers. Auer Register Co., Cleveland, O.

Aerofuse—Air diffusers. Tuttle & Bailey, Inc., New Britain, Conn.

Aerolux—Air conditioning units. Johnson Co., S. T., Philadelphia, Pa.

Aeromaster—Propeller fans. Aeromatic Propeller Dept., Koppers Co., Inc., Baltimore, Md.

Aeropass—Condensers. Niagara Blower Co., New York, N. Y.

Aeropel—Ventilators. American Blower Corp., Detroit, Mich.

Aeroplane—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aeroplex—Fans. Bayley Blower Co., Milwaukee, Wis.

Aeropull—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aero Seal—Packing. Chicago Belting Co., Chicago, Ill.

Aerospot—Fans. South Bend Air Products, Inc., South Bend, Ind.

Aerotec—Cleaners, collectors, separators, switches, valves. Thermix Corp., The, Greenwich, Conn.

Aerotum—Collectors. Newcomb-Detroit Co., Detroit, Mich.

Aerovane—Anemometers. Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.

Aerovane—Grilles, registers. Tuttle & Bailey, Inc., New Britain, Conn.

Afco—Heaters. American Furnace Co., St. Louis, Mo.

Affco—Louvers and shutters. American Foundry & Furnace Co., Bloomington, Ill.

Agastat—Time switches, electrical relays. American Gas Accumulator Co., Elizabeth, N. J.

Agile—Welding electrodes. American Agile Corp., Cleveland, O.

Agilene—Fittings, pipe, tubing, valves. American Agile Corp., Cleveland, O.

Agitair—Air diffusers; filters, heaters, ventilators. Air Devices, Inc., New York, N. Y.

Airacoustic—Insulation. Johns-Manville, New York, N. Y.

Airate—Ventilators. Dickinson, Aeolus, Chicago, Ill.

Air Cell—Asbestos insulation. Keasbey & Mattison Co., Ambler, Pa.

Airco—Arc welders, welding rod, solder, pipe cutting machines, torches. Air Reduction Sales Co., New York, N. Y.

Air Control—Fans, heaters, unit air conditioners. Hastings Air Conditioning Co., Hastings, Neb.

Air-Con—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

Airefiner—Water treatment. Oakite Products, Inc., New York, N. Y.

Airex—Air washers, fans, unit air conditioners, ventilators. Mountain States Equipment Co., Denver, Colo.

Air-flo—Louvers and shutters. Air Conditioning Products Co., Detroit, Mich.

Air Flow—Fans. Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.

Air Flow—Registers. The Louvra Corp., Union, N. J.

Airfoil—Fans, fan blades, ventilators. Aerovent Fan Co., Inc., Piqua, O.

Airfoil—Dampers, diffusers, grilles, registers. Titus Mfg. Corp., Waterloo, Ia.

Airgraph—Thermometers. Hausman Mfg. & Sales Co., Chicago, Ill.

Airguide—Hygrometers, indicators, thermometers. Fee and Stemwedel, Inc., Chicago, Ill.

Air Guide—Vanes. Titus Mfg. Corp., Waterloo, Ia.

Air Guide—Radiation. Rempe Co., Chicago, Ill.

Airidge—Ventilators. Dickinson, Aeolus, Chicago, Ill.

Airistocrat—Fan blades. Torrington Mfg. Co., Torrington, Conn.

Airjector—Ventilators. Swartwout Co., Cleveland, O.

Airlouver—Louvers and shutters. Swartwout Co., Cleveland, O.

Airlift—Ventilators. Swartwout Co., Cleveland, O.

Airliner—Fan blades. Burden Co., Alan E., Hollywood, Calif.

Airmaster—Dehumidifiers. Haertel Co., Walter, Minneapolis, Minn.

Airmat Arrester—Dust collectors. American Air Filter Co., Inc., Louisville, Ky.

Air-Max—Ventilators. Gallaher Co., The, Omaha, Neb. & Owatonna, Minn.

Air Meter—Air velocity meters. Hastings Instrument Co., Hampton, Va.

Airmover—Ventilators. Swartwout Co., Cleveland, O.

Airpak—Filters. Conoflow Corp., Philadelphia, Pa.

Airocool—Burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Airoil—Oil burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Air-O-Line—Indicator-controllers, recorder-controllers. Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.

Air-O-Line—Pumps, valves. Beckett & Co., Inc., Thomas, Dallas, Tex.

Air-O-Matic—Air conditioning units. Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.

Airotor—Blower wheels. Torrington Mfg. Co., Torrington, Conn.

Airout—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.

Airovent—Gas Burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Airsan—Filters. Air Filter Corp., Milwaukee, Wis.

Airstat — Regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Airswitch—Thermostats, regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Airtopia—Air conditioning units. Drayer & Hanson, Inc., Los Angeles, Calif.

Airtrol—Air eliminators. Bell & Gossett Co., Morton Grove, Ill.

Airtron—Ducts and duct fittings, hose, insulation. Arrowhead Rubber Co., Downey, Calif.

Air-Tumbler—Dust collectors. Dust Suppression & Engineering Co., Lake Orion, Mich.

Airturn—Duct turning vanes. Barber-Colman Co., Rockford, Ill.

Airvalve—Ventilators. Swartwout Co., Cleveland, O.

Air-Van—Ventilators, exhausters. The Gallaher Co., Owatonna, Minn., Omaha, Neb.

Air-Wave—Fans. Trade-Wind Motorfans, Inc., Los Angeles, Calif.

Airxpel—Traps. Wright-Austin Co., Detroit, Mich.

Airxpeler—Roof ventilators. Ammerman Co., G. L., Minneapolis, Minn.

Ajax—Gaskets, United States Gasket Co., Camden, N. J.

Akon—Water treatment. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Aktiv—Cleaning compounds. Turco Products, Inc., Los Angeles, Calif.

Alcalex—Water softeners. Research Products Corp., Madison, Wis.

Alco—Ventilators. Lumm Co., A. H., Toledo, O.

Alcoa—Angles, compounds, rods, dehydrators, electrodes, exchangers, pipe, sheets, tanks, tubing. Aluminum Co. of America, Pittsburgh, Pa.

Alcuplate—Clad sheets. General Plate Div., Metals & Controls Corp., Attleboro, Mass.

Alfol—Insulation. Reflectal Corp., New York, N. Y.

Algaecide—Water treatment. Western Chemical Co., Kansas City, Mo.

Allencote—Refractories and refractory cement. Allen Co., Robert G., Mechanicsville, N. Y.

Allenite—Soot destroyers. Allen Co., Robert G., Mechanicsville, N. Y.

All-Flex—Pipe joints, hose, packing. Gil-Lair Products, Inc., Pasadena, Calif.

All-In-One—Regulators. Bell & Gossett Co., Morton Grove, Ill.

Allspeed Selector—Mechanical changers. Worthington Pump & Machinery Corp., Harrison, N. J.

Alnor—Anemometers, indicator controllers, thermometers. Illinois Testing Laboratories, Inc., Chicago, Ill.

Alodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.

Aloyco—Pipe, tubing, valves. Alloy Steel Products Co., Linden, N. J.

Alpine—Air conditioning units. International Metal Products Co., Phoenix, Ariz.

Allprene—Gaskets. Chicago Gasket Co., Chicago, Ill.

Alrosept—Slime and algae control treatment. Alrose Chemical Co., Providence, R. I.

Alternarc—Arc welders. Electric Arc, Inc., Newark, N. J.

Alumaweld—Solder and fluxes. Johnson Mfg. Co., Inc., Mt. Vernon, Ia.

Aluminweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Alumiseal—Insulation. Hogan & Co., Inc., C. T., New York, N. Y.

A-Lum-O—Filters. Bard Mfg. Co., Bryan, O.

A-Lum-O—Filters. Carey Electronic Engineering Co., Metal Wool Div., Springfield, O.

Always Reliable—Benders, cutters, torches, wrenches. Bernz Co., Otto, Rochester, N. Y.

Amblerex—Insulating cement. Keasbey & Mattison Co., Ambler, Pa.

Amco—Protective coatings. American Solder

& Flux Co., Philadelphia, Pa.

Amco—Humidifiers. Grinnell Co., Inc., Providence, R. I.

Amco—Control Systems, humidifiers, hygrometers, indicators, meters, nozzles, tanks, air conditioning units, valves. American Moistening Co., Providence, R. I.

Amcoil—Condensers, radiation, cooling and heating surfaces. American Coils Co., Newark, N. J.

Amer-glas—Unit filters. American Air Filter Co., Inc., Louisville, Ky.

American—Absorbers, metal hose. American Metal Hose Branch, American Brass Co., The, Waterbury, Conn.

American—Couplings. American Flexible Coupling Co., Erie, Pa.

American—Furnaces, heaters. American Foundry & Furnace Co., Bloomington, Ill.

American—Recorders, hygrometers, indicator-controllers, manometers, regulators, valves, thermometers, transmitters. Manning, Maxwell & Moore, Inc., Stratford, Conn.

American—Meters. American Meter Co., Inc., New York, N. Y.

American—Speed reducers. American Pulley Co., Philadelphia, Pa.

American—Pumps, softeners, water filters, water treatment. American Well Works, Aurora, Ill.

American—Pipe benders. American Pipe Bending Machine Co., Inc., Poultney, Vt.

American—Radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Empire—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Exbrook—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Hy—Unit Filters. American Air Filter Co., Inc., Louisville, Ky.

American Redflash-Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Standard—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Superfin—Heaters. American Foundry & Furnace Co., Bloomington, Ill.

American Water Tube—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Amerigear—Couplings. American Flexible Coupling Co., Erie, Pa.

Ameritherm—Heaters, air conditioning units. American Thermal Industries, Inc., Detroit, Mich.

Amesteam—Boilers. Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.

Aminco—Indicator-controllers, indicators, American Instrument Co., Silver Spring, Md.

Ammonoduct—Pipe. Bethlehem Steel Co., Bethlehem, Pa.

Amocel—Insulation. Union Asbestos & Rubber Co., Chicago, Ill.

Am-Pe-Co—Centrifugal fans. American Machine Products Co., Marshalltown, Ia.

Amtico—Heaters, air conditioning units. American Thermal Industries, Inc., Detroit, Mich.

Anaconda—Fittings, pipe, welding rod, sheets, solder, tubing, valves. American Brass Co., Waterbury, Conn.

Anemotherm—Direct reading meters, Anemostat Corp. of America, New York, N. Y.

Ankorite—Packing. Anchor Packing Co., Philadelphia, Pa.

Anthracite 1600—Water heaters. Catskill Metal Works, Inc., Catskill, N. Y.

Anti-Spatter—Welding compounds. Wolfe-Kote Co., Inc., Sheboygan, Wis.

Anti-Sweat—Insulation. Johns-Manville, New York, N. Y.

Apeco—Blueprint machines. American Photocopy Equipment Co., Chicago, Ill.

Apex—Analyzers, recorders, indicators. Uehling Instrument Co., Paterson, N. J.

Apexior—Coatings. Dampney Co., The, Boston, Mass.

Aqua-Clear—Water treatment. Sudbury Laboratory, South Sudbury, Mass.

AquaHeater—Heaters. Lewis & Co., Joseph E., Baltimore, Md.

Aqualator—Circulators. Triplex Heating Specialty Co., Inc., Peru, Ind.

Aquamizer—Condensers. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

Aquanite—Enamels & lacquers. Atlas Powder Co., Industrial Finishes Dept., North Chicago, Ill.

Aquastat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Aqua-Tite—Seals. Schwitzer-Cummins Co., Indianapolis, Ind.

Aquatone—Treatment, steam and water. Ampion Corp., Long Island City, N. Y.

Aquatower—Cooling towers. Marley Co., Inc., The, Kansas City, Mo.

Aqulux—Heaters. Johnson Co., S. T., Philadelphia, Pa.

Arbest—Flanges, hangers, humidifiers, nipples, plates, valves. G & H Mfg. Co., Philadelphia, Pa.

Arc-Eng—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

Arc-Heat—Burners. American Heat Corp., Lowell, Mass.

Arco—Packing. Chicago Belting Co., Chicago, Ill.

Arco—Hangers, radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Arctic Circle—Air conditioning units. Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.

Arctic Circle—Air conditioning units. International Metal Products Co., Phoenix, Ariz.

Arex-Austor—Roof ventilators. Arex Co., Chicago, Ill.

Arid Air—Dehumidifiers. Tamms Industries, Inc., Chicago, Ill.

Arin—Louvers and shutters. Arex Co., Chicago, Ill.

Armaloy—Wrenches. Armstrong Bros. Tool Co., Chicago, Ill.

Armorak—Insulation. Keasbey Co., Robert A., New York, N. Y.

Armstrong Bros.—Cutters, reamers, pipe vise stands, stocks and dies, pipe tongs, tubing tools, pipe vises, wrenches. Armstrong Bros. Tool Co., Chicago, Ill.

Arrowtrol—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

Art—Direct radiation. The National Radiator Co., Johnstown, Pa.

Artcraft—Air heaters. Chicago Steel Furnace Co., Chicago, Ill.

Artic—Refrigerant. E. I. du Pont de Nemours & Co., Wilmington, Del.

Asbestocel—Insulation. Johns-Manville, New York, N. Y.

Asco—Valves, relays, switches. Automatic Switch Co., Orange, N. J.

Ashcroft—Gages, cocks, recorders, testers, transmitters. Manning, Maxwell & Moore, Inc., Stratford, Conn.

At-a-Glance—Gages. Krueger Sentry Gauge Co., Green Bay, Wis.

Atlas—Fans, furnaces, heaters. International Sales Co., San Francisco, Calif.

Atmoset—Cement. Green Fire Brick Co., Mexico, Mo.

Atomick—Humidifiers, nozzles. Maid-O'-Mist, Inc., Chicago, Ill.

Atomist—Humidifiers. American Foundry & Furnace Co., Bloomington, Ill.

Autocrat—Oil burners. Chandler Co., Cedar Rapids, Ia.

Autographs—Nameplate parts. Metalcraft Inc., Mason City, Ia.

Auto-Klean—Filters, strainers. Cuno Engineering Corp., Meriden, Conn.

Autolite—Motors, wire, recorders, thermometers. Electric Autolite Co., Instrument & Gauge Div., Toledo, O.

Autolube—Bearings. International Powder Metallurgy, Inc., Ridgway, Pa.

Automatic Heat—Heaters. Heat Equipment not Inc., Chicago, Ill.

Autovent—Eliminators, humidifiers, valves. Maid-O'-Mist, Inc., Chicago, Ill.

Axivane—Blowers & Fans. Joy Mfg. Co., Pittsburgh, Pa.

B.A.C.—Condensers. Baltimore Aircoil Co., Inc., Baltimore, Md.

B. B.—Blast gates. Berger Bros. Co., Philadelphia, Pa.

B & B—Heating and air conditioning equipment. Bishop & Babcock Mfg. Co., Cleveland, O.

B & C—Plates, malleable unions. Beaton & Corbin Mfg. Co., Southington, Conn.

BCA—Bearings. Bearings Co. of America, Lancaster, Pa.

B. F. C.—Fans. Baltimore Fan Co., Baltimore, Md.

B. & G.—Air eliminators, circulators, coolers, condensers, fittings, hangers, heat exchangers, heaters, heating systems, temperature regulators, tanks, valves. Bell & Gossett Co., Morton Grove, Ill.

B-H—Insulation. Baldwin-Hill Co., Trenton, N. J.

B-H—Insulating cement, pipe insulation. Baldwin-Hill Co., Trenton, N. J.

B-H Powerhouse—Insulation. Baldwin-Hill Co., Trenton, N. J.

B & J—Orifices, strainers, systems, traps, valves. Barnes & Jones, Inc., Boston, Mass.

B & K—Pipe cutting and threading machines. Bignall & Keeler, Div., John Ramming Machine Co., St. Louis, Mo.

B-Line—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.

B & P Enamel—Enamels and lacquers. Tropical Paint & Oil Co., Cleveland, O.

BRI Gun—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.

B & W—Boilers, burners, desuperheaters, fuel economizers, refractories, stokers, superheaters. Babcock & Wilcox Co., New York, N. Y.

B & W—Pipes, tubes, and tubing. Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.

B & W—Tubing. Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.

Bacite—Insulation. Bird-Archer Co., Philadelphia, Pa.

Baco—Soot destroyer. Bird-Archer Co., Philadelphia, Pa.

Badger—Time switches. Reliance Automatic Lighting Co., Racine, Wis.

Baflex—Enamels and lacquers, protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.

Bakeraire—Unit air conditioners. Baker Refrigeration Corp., South Windham, Me.

Balancer—Heating systems. Automatic Temperature Control Co., Inc., Philadelphia, Pa.

Baldwin-Rex—Couplings, chain drives. Chain Belt Co., Milwaukee, Wis.

Ball Bushings—Ball bearings. Thomson Industries, Inc., Manhasset, N. Y.

Balsam-Wool—Insulation. Wood Conversion Co., St. Paul, Minn.

Bankheat—Oil burners. Johnson Co., S. T., Philadelphia, Pa.

Barcol—Humidistats, motors, operators, regulators, thermostats, valves. Barber-Colman Co., Rockford, Ill.

Barnes—Cutters. Erie Tool Works, Erie, Pa.

Barreled Sunlight—Enamels. U.S. Gutta Percha Paint Co., Providence, R. I.

Barry—Bearings, pulleys and sheaves. Dick Co., Inc., R. & J., Passaic, N. J.

Barton-American—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.

Base Ray—Baseboard radiation. Burnham Corp., Boiler Div., Irvington, N. Y.

Basic Magnesite—Refractories. Basic Refractories, Inc., Cleveland, O.

Basifrit—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.

Beacor—Valves. Beaton & Corbin Mfg. Co., Southington, Conn.

Beaverkill—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.

Beco-Cell—Corrosion treatment, scale removal. Brown Electro Co., Oklahoma City, Okla.

Belco—Fans, louvers and shutters. Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.

Bell-Pack—Clamps. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.

Beloit—Machines, punches, power shears. Hendley & Whittemore Co., Beloit, Wis.

Bend-Ezy—Grilles, registers. Standard Stamping & Perforating Co., Chicago, Ill.

Bermico—Fiber glass. Brown Co., Boston, Mass.

Bestfelt—Insulation. Keasbey & Mattison Co., Ambler, Pa.

Beth-Co-Weld—Pipe. Bethlehem Steel Co., Bethlehem, Pa.

Beth-Cu-Loy—Sheets. Bethlehem Steel Co., Bethlehem, Pa.

Bi-Air—Burners. John Zink Co., Tulsa, Okla.

Bifurcator—Fans. DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.

Bildrite—Insulation. Insulite Co., Minneapolis, Minn.

Bilt-Rite—Doors and panels. Canton Stoker Corp., Canton, O.

Bi-Mix—Burners. John Zink Co., Tulsa, Okla.

Binoc—Thermometers. Taylor Instrument Companies, Rochester, N. Y.

Bison—Boilers. Farrar & Trefts, Buffalo, N. Y.

Bitumastic—Protective coatings. Koppers Co., Inc., Pittsburgh, Pa.

Bituminous—Bases and pads. Celotex Corp., The, Chicago, Ill.

Bituminous—Coatings. Robertson Co., H. H., Pittsburgh, Pa.

Bituplastic—Coatings. Koppers Co., Inc., Pittsburgh, Pa.

Black Baking Japans—Enamels and lacquers. Hilo Varnish Co., Brooklyn, N. Y.

Black Magic—Pipe covering adhesives, protective coatings. Miracle Adhesives Corp., New York, N. Y.

Black Magic—Cement and compounds. Bowser, Inc., Fort Wayne, Ind.

Blazecrete—Refractories. Johns-Manville, New York, N. Y.

Bloapco—Dust collectors. Blower Application Co., Milwaukee, Wis.

Blo-Cold—Unit coolers. Acme Industries, Inc., Jackson, Mich.

Bloflex—Hose. American Ventilating Hose Co., New York, N. Y.

Blowertrol—Speed changers. White Mfg. Co., St. Paul, Minn.

Blu-Cold—Compressors. Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.

Blueknight—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.

Blue-Point—Cutters, Tools, wrenches. Snap-on Tools Corp., Kenosha, Wis.

Blue Ribbon—Headers and nipples. Chicago Nipple Mfg. Co., Cicero, Ill.

Blue Streak—Blueprint machines. Paragon-Revolute Corp., Rochester, N. Y.

Boardman—Pump governors. Locke Regulator Co., Salem, Mass.

Bob—Float valves. Robert Mfg. Co., Los Angeles, Calif.

Boilergard—Low water cut-offs. Maid-O'-

Mist, Inc., Chicago, Ill.

Boiler-Lox—Compounds. Radiator Specialty Co., Charlotte, N. C.

Boiler Solder Seal—Compounds. Radiator Specialty Co., Charlotte, N. Carolina.

Bosco—Clay pipe. Bowerston Shale Co., Bowerston, O.

Brad-Ray—Radiant heating coils and panels. Jos. L. Bradfield, Indianapolis, Ind.

Branford—Oil burners, unions. Malleable Iron Fittings Co., Branford, Conn.

Brassweld—Compounds. Sight Feed Generator Co., West Alexandria, O.

Brazo—Solder. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.

Breathe-O-Stat—Thermostats. McLarty Systems, Battle Creek, Mich.

Breeze Master—Fans. Acme Equipment Co., Muskogee, Okla.

Breezo—Fans. Buffalo Forge Co., Buffalo, N. Y.

Breezy-Air—Air conditioning units. Barwick Mfg. Corp., Wichita, Kan.

Brommell—Eliminators, floats, heating systems, traps, valves. Vapor Specialty Co., New York, N. Y.

Bronzende—Electrodes. Arcos Corp., Philadelphia, Pa.

Bronzeweld—Compounds. Sight Feed Generator Co., West Alexandria, O.

Brooklyn—Adhesive tape. Johns-Manville, New York, N. Y.

BTUnit—Unit heaters. Industrial Mfg. & Engineering Co., Chicago, Ill.

Budget—Water heaters. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Bulator—Grilles. Hendrick Mfg. Co., Carbondale, Pa.

Bulldog—Shears and snips. Wiss & Sons Co., J., Newark, N. J.

Bull Dog—Stocks and dies. Oster Mfg. Co., Cleveland, O.

Bull Dog—Pipe and tubing. Phelps Dodge Copper Products, British American Tube Div., New York, N. Y.

Bull Dog—Valves. The Carpenter Mfg. Corp., Cleveland, O.

Bundyflex—Steel tubing. Everhot Products Co., Chicago, Ill.

Bundyweld—Tubes and tubing. Bundy Tubing Co., Detroit, Mich.

Bunker Hill—Fittings, pipe, sheets, solder. Northwest Lead Co., Seattle, Wash.

Burks—Pumps. Decatur Pump Co., Decatur, Ill.

Burnham—Compressors, condensers, pumps. Union Steam Pump Co., Battle Creek, Mich.

C-E—Boilers, burners, stokers, fuel economizers. Combustion Engineering - Superheater, Inc., New York, N. Y.

C F B Super—Cement. Chicago Fire Brick Co., Chicago, Ill.

C-H—Alarms, controllers and starters, heaters, relays, regulators, switches, valves. Cutler-Hammer, Inc., Milwaukee, Wis.

C & M—Hangers or brackets. Carty & Moore Engineering Co., Detroit, Mich.

CMH—Pipe joints. Chicago Metal Hose Corp., Maywood, Ill.

COM—Blowers. Wing Mfg. Co., L. J., New York, N. Y.

C & R—Regulators. Automatic Control Co., St. Paul, Minn.

CSP—Transformers. Westinghouse Electric Corp., Pittsburgh, Pa.

CW—Pipe. Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.

Cadillac-Meters. Central Station Steam Co., Detroit, Mich.

Cadman—Valves. Barrett Machine Co., Pittsburgh, Pa.

Cadwell—Pressure regulators, valves. Beaton & Cadwell Mfg. Co., New Britain, Conn.

Calco—Valves. California Brass Mfg. Co., Los Angeles Calif.

Calktite—Cement and compounds. U. S. Stoneware Co., New York, N. Y.

Calorex—Oil burners. W. N. Best Combustion Equipment Co., Inc., Carlstadt, N. J.

Cantilever—Hygrometers. Standard Thermometers, Inc., Boston, Mass.

Capacilogs—Temperature recorders. Wheelco Instruments Co., Chicago, Ill.

Capacitrols—Indicator - controllers. Wheelco Instruments Co., Chicago, Ill.

Capillary—Air washers. Clarage Fan Co., Kalamazoo, Mich.

Capillary—Air washers, humidifiers, cooling towers, unit air conditioners. Air & Refrigeration Corp., New York, N. Y.

Capitol—Boilers, hanger or brackets, heaters, radiation. United States Radiator Corp., Detroit, Mich.

Carbolite—Soot destroyers. Ampion Corp., Long Island City, N. Y.

Careyduct—Ducts and duct fittings, insulation, non-metallic sheets, duct turning vanes. Carey Mfg. Co., Philip, Lockland, Cincinnati, O.

Cash-Acme—Heating systems, pipe strainers, regulators, valves. Cash Valve Mfg. Co., A. W., Decatur, Ill.

Castalu—Fans, wheels. Advance Aluminum Castings Corp., Chicago, Ill.

Cast-Refract—Refractories. Quigley Co., Inc., New York, N. Y.

Catch-All—Dehydrators. Sporlan Valve Co., St. Louis, Mo.

Causul—Valves. Lunkenheimer Co., Cincinnati, O.

Celeritas—Colorimeters. Daigger & Co., A., Chicago, Ill.

Celeron—Couplings, fittings. Continental Diamond Fibre Co., Newark, Del.

Cell-U-Blanket—Insulation. Masonite Corp., Chicago, Ill.

Cellufoam—Insulation. Masonite Corp., Chicago, Ill.

Celo-Siding—Insulation. Celotex Corp., The, Chicago, Ill.

Cemcoat—Enamels and lacquers. Sonneborn Sons, Inc., New York, N. Y.

Cementseal—Enamels and lacquers. Acorn Refining Co., Cleveland, O.

Cemesto—Insulation. Celotex Corp., The, Chicago, Ill.

Central Aire—Unit air conditioners. Baker Refrigeration Corp., South Windham, Me.

Central—Conduit. Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.

Centrimax—Meters. Leeds & Northrup Co., Philadelphia, Pa.

Centripac—Packing. Johns-Manville, New York, N. Y.

Centripeller—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Centrispray—Air Washers. Bahnson Co., Winston-Salem, N. C.

Certified Climate—Air conditioning units. Parks-Cramer Co., Fitchburg, Mass.

Cesco—Fittings. Columbia Engineering Service Co., San Francisco, Calif.

Chaco—Boiler and radiator sealing compounds. Desolvo Co., The, Pittsburgh, Pa.

Challenger—Propeller fans. Signal Electric Mfg. Co., Menominee, Mich.

Champion—Furnaces, heaters. National Heater Co., St. Paul, Minn.

Champion—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.

Champion—Pumps. Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.

Chan-L-Mounts—Bases and pads. Lord Mfg. Co., Erie, Pa.

Charg-A-Can—Refrigerants. Eston Chemicals, Inc., Los Angeles, Calif.

Chemiseal—Gaskets, joints, packing. United States Gasket Co., Camden, N. J.

Chem-o-Feeder—Feeders, pumps, water treatment. % Proportioneers, Inc., % Providence, R. I.

Chenco—Compounds, water treatment. Chemical Engineering Co., Dallas, Tex.

Chevron—Packing. Garlock Packing Co., Palmyra, N. Y.

Chicago—Brakes. Dreis & Krump Mfg. Co., Chicago, Ill.

Chicago—Stokers. Eddy Stoker Corp., Chicago, Ill.

Chicago—Stokers. Read Standard Corp., Blower-Stoker Div., Erie, Pa.

Chicago-Wrigley—Bolts. Chicago Expansion Bolt Co., Chicago, Ill.

Chico Brikset—Cement. Chicago Fire Brick Co., Chicago, Ill.

Chieftain—Compressors. Tecumseh Products Co., Tecumseh, Mich.

Chief Thred-O-Matic—Pipe cutting machines. Quijada Tool Co., Inc., Los Angeles, Calif.

Chill Air—Air conditioning units. National Engineerng & Mfg. Co., Kansas City, Mo.

Chill Vactor—Chillers and steam jet compressors. Croll-Reynolds Engineering Co., Inc., New York, N. Y.

Chimney Sweep—Chemical destroyers. Coughlan Co., G. N., West Orange, N. J.

Chinook—Ferrous heating surface. Bayley Blower Co., Milwaukee, Wis.

Chinookfin—Ferrous heating surface. Bayley Blower Co., Milwaukee, Wis.

Chlorimet—Heat exchangers, fans, fittings, heaters, pipe, pumps, sheets, valves. Duriron Co., Inc., The, Dayton, O.

Chlor-O-Mite—Pumps. % Proportioneers, Inc.,% Providence, R. I.

Chore Boy—Burners. Standard Fuel Engineering Co., Detroit, Mich.

Chromalox—Preheaters, indicators-controllers, heating systems, superheaters, thermostats, unit heaters. Wiegand Co., Edwin L., Pittsburgh, Pa.

Chrome Lock—Gaskets. Products Research Co., Los Angeles, Calif.

Chromend—Electrodes. Arcos Corp., Philadelphia, Pa.

Chromeweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.

Chromix—Refractories. Quigley Co., Inc., New York, N. Y.

Chronoflo—Flow meters, recorders. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.

Chronometer—Valves. Defender Instrument & Regulator Co., St. Louis, Mo.

Chronotherm—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis.

Cinch—Expansion bolts. National Lead Co., New York, N. Y.

Circle Seal—Check valves. James-Pond-Clark, Pasadena, Calif.

Circle T—Switches. Trumbull Dept., General Electric Co., Plainville, Conn.

Circo—Louvers and shutters, fan housings. Circulators & Devices Mfg. Co., Brooklyn, N. Y.

Clair-Tex—Connections. St. Clair Rubber Co., Detroit, Mich.

Clamp-A-Leak—Pipe repair clamps. Chelsea Metal Stamping Co., New York, N. Y.

Clarco—Unit heaters. Clarage Fan Co., Kalamazoo, Mich.

Classic—Registers. Auer Register Co., Cleveland, O.

Clevite—Bearings. Cleveland Graphite Bronze Co., Cleveland, O.

Cliff—Boilers, water heaters. Terre Haute Boiler Works Co., Terre Haute, Ind.

Climate Changer—Unit air conditioners, unit air coolers. Trane Co., The, LaCrosse, Wis.

Climatrol—Boilers, furnaces, heaters, fans, metallic ducts. Mueller Furnace Co., L. J., Milwaukee, Wis.

Clime-Matic—Unit air conditioner. United Conditioning Corp., New York, N. Y.

Clime-matic Coey—Cooling towers. United Conditioning Corp., New York, N. Y.

Clipper—Fans. Trade-Wind Motorfans, Inc., Los Angeles, Calif.

Clipper—Seals. Johns-Manville, New York.

Clorodine—Boiler cleaning compounds. American Chemical Paint Co., Ambler, Pa.

Closin—Bolts. Star Expansion Bolt Co., New York, N. Y.

Cocheo—Belting. Williams & Son, I. B., Dover, N. H.

Colalloy—Couplings, nipples, pipe. Colonial Alloys Co. Metals Div., Philadelphia, Pa.

Coldjet—Unit coolers, air conditioning units. Industrial Mfg. & Engineering Co., Chicago, Ill.

Coltemp—Insulation. Badham Insulation Co., Inc., Birmingham, Ala.

Columbia—Odor adsorbers, air conditioning units. Carbide and Carbon Chemicals Co., A Div. of Union Carbide and Carbon Corp., New York, N. Y.

Columbia—Ventilators. E. E. Souther Iron Co., St. Louis, Mo.

Combi-Matic—Burners. Siemon & Co., Kansas City, Mo.

Combustioneer—Stokers. Steel Products Engineering Co., Springfield, O.

Comet—Fans, unit heaters. New York Blower Co., Chicago, Ill.

Comfort Control—Temperature regulators. Bell & Gossett Co., Morton Grove, Ill.

Comfort Master—Barometric controls. A-P Controls Corp., Milwaukee, Wis.

Comfortrol—Switches. Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.

Comfostat—Thermostats. Johnson Service Co., Milwaukee, Wis.

Co-Min-Co—Insulating cement. United States Mineral Wool Co., South Milwaukee, Wis.

Compact-Boilers. Titusville Iron Works Co., The, Titusville, Pa.

Compass—Belting. Goodyear Tire & Rubber Co., Akron, O.

Compound Lever—Hand shears and snips. Bartlett Mfg. Co., Detroit, Mich.

Conco—Boiler cleaning compounds, water treatment. Continental Products Co., Euclid, O.

Condor—Belting, V belts, pipe. Raybestos-Manhattan, Inc., Passaic, N. J.

Condo-Vac—Vacuum pumps. Chicago Pump Co., Chicago, Ill.

Coni-Vane—Ventilators. Allen Ventilator Div., Production Planning Co., Rochester, Mich.

Conomotors—Duct and valve operators. Conoflow Corp., Philadelphia, Pa.

Conseco—Water chillers, tube cleaners, coils, compressors, condensers, oil coolers, dryers, heat exchangers, filters, headers, water heaters, joints, preheaters, pumps, separators, superheaters, tanks, cooling towers. Condenser Service & Engineering Co., Inc., Hoboken, N. J.

Consolidated—Valves. Manning, Maxwell & Moore, Inc., Stratford, Conn.

Constellation Line—Arc welders. Trindl Products, Ltd., Chicago, Ill.

Con-Tac-Tor—Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Convect-O-Base—Baseboard radiation. Minimite Co., Chicago, Ill.

Convect-O-Fin—Fin tube radiation, tubing, Minimite Co., Chicago, Ill.

Convector—Humidifiers. Maid-O'-Mist., Inc., Chicago, Ill.

Converto—Roof ventilators. Ammerman Co., C. L., Minneapolis, Min.

Conveyoflo—Conveyors. Builders-Providence, Inc., Providence, R. I.

Conveyor—Pulleys and sheaves. The American Pulley Co., Philadelphia, Pa.

Coolair—Fans, louvers and shutters, ventilators, ventilator units. American Coolair Corp., Jacksonville, Fla.

Cool-A-Matic—Air conditioning units. Automatic Firing Corp., St. Louis, Mo.

Cooler-Aire—Window type cooling units.

Baltimore Porcelain Steel Corp., Baltimore, Md.
Coolero—Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Coolite—Windows. Mississippi Glass Co., New York, N. Y.
Coolmaster—Unit coolers. Kramer Trenton Co., Trenton, N. J.
Cool Spot—Propeller fans. Signal Electric Mfg. Co., Menominee, Mich.
Copaltite—Cement and compounds, gaskets. National Engineering Products, Inc., Washington, D. C.
Copes—Governors, regulators, steam desuperheaters, valves, water alarms, indicators. Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Cop-R-Loy—Sheets. Wheeling Steel Corp., Wheeling, W. Va.
Copr-Tube—Fittings. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Copyflex—Blueprint machine. Bruning Co., Inc., Charles, Chicago, Ill.
Coravol—Corrosion treatment. Western Chemical Co., Kansas City, Mo.
Cor-In Galvanode—Electrolytic devices. Rotometals, Inc., San Francisco, Calif.
Cornelius—Air compressors and regulators. North Penn Co., New York, N. Y.
Corogard—Protective Coatings. Minnesota Mining & Mfg. Co., St. Paul, Minn.
Corosex—Water treatment. Research Products Corp., Madison, Wis.
Corrodicide—Water treatment. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Corrodine—Corrosion inhibition. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Corrosanti—Corrosion inhibition. Dr. Adolph Schror, East Orange, N. J.
Cosmolubric—Refrigeration oil. Houghton & Co., E. F., Philadelphia, Pa.
Cotospray—Nozzles. J. F. Pritchard & Co., Kansas City, Mo.
Cotoid—Coatings. Lithgow Corp., Chicago, Ill.
Cottrell—Dust collectors. Research Corp., New York, N. Y.
Cottrell—Dust collectors. Western Precipitation Corp., Los Angeles, Calif.
Coxe—Stokers. Combustion Engineering-Superheater, Inc., New York, N. Y.
Co-Z-Air—Electric radiators. Conco Engineering Wks., Div. of H. D. Conkey & Co., Mendota, Ill.
Crescent—Boiler gage cocks, Wright-Austin Co., Detroit, Mich.
Crescent—Furnaces. Century Engineering Corp., Cedar Rapids, Ia.
Croloy—Pipe, tubes, and tubing. Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Cromaloy—Solder. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Cross-Flo—Dehydrators. Remco, Inc., Zelienople, Pa.
Crown—Cement and compounds. Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Crystals—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Cushion-Cradled—Burners. Century Engineering Corp., Cedar Rapids, Ia.
Customair—Air conditioning units. Trane Co., The, La Crosse, Wis.
Custom Built—Unit air conditioners. Baker Refrigeration Corp., South Windham, Me.
Cut Master—Vertical turret lathes. Bullard Co., The, Bridgeport, Conn.
Cutno—Packing. Greene, Tweed & Co., North Wales, Pa.
Cycloidal—Air washers. Blower Application Co., Milwaukee, Wis.
Cycoil—Filters. American Air Filter Co., Louisville, Ky.
Cyclone—Exhaust heads. Wright Austin Co., Detroit, Mich.
Cyclops—Roller bearings. Roller Bearing Co. of America, Trenton, N. J.

DFN—Dehydrators, filters. McIntire Connector Co., Newark, N. J.
DFN Du-cal Drierite—Dehydrators, McIntire Connector Co., Newark, N. J.
DH—Ball bearings. Dodge Mfg. Corp., Mishawaka, Ind.
D.I.P.—Insulation, piping. Durant Insulated Pipe Co., Palo Alto, Calif.
D-O—Adsorbers. Research Products Corp., Madison, Wis.
D-O Kote—Adsorbers. Research Products Corp., Madison, Wis.
DV—V-belt drives. Dodge Mfg. Corp., Mishawaka, Ind.
Daptoblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Dart—Unions. Fairbanks Co., New York, N. Y.
Dawnblast—Unit heaters. Sturtevant Co., B. F., Div. of Westinghouse Electric, Boston, Mass.
Day-Nite Acratherm—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Day-Steel—Pulleys. Dayton Rubber Co., Dayton, O.
Dean—Cleaners. Pierce Co., Wm. B., The, Buffalo, N. Y.
Debecote—Coatings. Debevoise Co., The, Brooklyn, N. Y.
Deflecto—Ventilators. Day Co., The, Minneapolis, Minn.
Deflecto-Grilles—Grilles. United States Air Conditioning Corp., Minneapolis, Minn.
Defrostolator—Hot gas defrosting systems. Tenney Engineering, Inc., Newark, N. J.
Demandtrol—Valves. Gold Top Heating, Inc., Butte, Mont.
Demon Air-Set—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Densitron—Alarms. Ripley Co., Inc., Middletown, Conn.
Deoxidine—Cleaning compounds. American Chemical Paint Co., Ambler, Pa.
Dereka—Protective coatings. Debevoise Co., The, Brooklyn, N. Y.
Desert Air—Burners. Central States Mfg. Co., Inc., Arkansas City, Kan.
Desmond-Simplex—Pipe vises. Desmond-Stephan Mfg. Co., Urbana, O.
Desomatic—Dehumidifiers. Daly, Merritt & Sullivan, Inc., Falls Church, Va.
De-Sta-Co.—Fan housings, pipe clamps, valves. Detroit Stamping Co., Detroit, Mich.
Detroit—Traps. Nason Co., Clarkston, Mich.
Detroit LoStoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Detroit Rotograte Stoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Detroit Rotostoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Detroit Unistoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Dexter—Valve reseaters, air separators, steam traps. Leavitt Machine Co., Orange, Mass.
Di-Acro—Benders, brakes, machines, shears. O'Neil Irwin Mfg. Co., Lake City, Minn.
Dial—Regulators. Parker-Kalon Corp., New York, N. Y.
Dial-A-Speed—Motors. Brown-Brockmeyer Co., Inc., Dayton, O.
Dialco—Pilot and signal lights. Dial Light Co. of America, Inc., New York, N. Y.
Dialon—Radiator valves, Bridgeport Brass Co., Bridgeport, Conn.
Diamond—Cement. Green Fire Brick Co., Mexico, Mo.
Diamond—Compounds, enamels and lacquers. Thompson & Co., Oakmont, Pa.
Diamond Fibre—Gaskets. Continental Diamond Fibre Co., Newark, Del.
Diamond H—Switches, thermostats, regulators, relays. Hart Mfg. Co., Hartford, Conn.
Diaphlex—Bellows, relays, solenoids, and switches. Cook Electric Co., Chicago, Ill.
Dia-Seal—Valves. Imperial Brass Mfg. Co., Chicago, Ill.
Dickbelt—Belting and drives. Dick Co., Inc., R. & J., Passaic, N. J.
Dickinson Ferrocast—Exhaust heads, ventilators. Dickinson, Aeolus, Chicago, Ill.
Dickrope—V belts and drives. Dick Co., Inc., R. & J., Passaic, N. J.
Dickvalve—Valves. Dick Co., Inc., R. & J., Passaic, N. J.
Diesel American—Oil burners. Diesel Oil Burner Corp. of New York, Jamaica, Long Island, N. Y.
Dieselite—Corrosion prevention. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Dilecto—Plastic pipe. Continental Diamond Fibre Co., Newark, Del.
Direct—Pipe fittings and flanges. Straight Line Foundry & Machine Corp., Direct Separator Div., The, Syracuse, N. Y.
Directrol—Vanes. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Discfin—Cooling surface. General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Disc-Loc—Registers. Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Distributor—Radiation. Kehm Corp., The, Chicago, Ill.
Divco—Fittings, pipe and tubing, sheets, solder, valves. Division Lead Co., Chicago, Ill.
Dix—Universal joints. Lovejoy Flexible Coupling Co., Chicago, Ill.
Dixigas—Gas welding rod. Atlantic Steel Co., Atlanta, Ga.
Dixisteel—Pipe hangers and supports, angles, flanges. Atlantic Steel Co., Atlanta, Ga.
Do-All—Combination hammer and drill. Wodack Electric Tool Corp., Chicago, Ill.
Do-Mor—Saw tools. Pioneer Tool Co., Racine, Wis.
Dominion—Gaskets, packing. Darcoid Co., Inc., New York, N. Y.
Dorex—Adsorbers. W. B. Connor Engineering Corp., Danbury, Conn.
Double Check—Boiler compounds. Hampton-Cross Co., The, Louisville, Ky.
Double Diamond—Hygrometers, recorders, psychrometers. H-B Instrument Co., Philadelphia, Pa.
Double-Flow—Cooling towers. Marley Co., Inc., The, Kansas City, Mo.
Double-Seal—Copper tube fittings. Hays Mfg. Co., Erie, Pa.
Double U—Packing. Wayne Davies & Co., Westboro, Mass.
Dowmetal—Sheets, tubing, welding rod. Dow Chemical Co., Midland, Mich.
Downblast—Unit heaters. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Dowtherm—Process heating systems. Dow Chemical Co., The, Midland, Mich.
Draft-A-Justor—Draft controls. Preferred Utilities Mfg. Corp., New York, N. Y.
Draftender—Regulators Penn Controls, Inc., Goshen, Ind.
Draft-O-Stat—Barometric controls. Hotstream Heater Co., Cleveland, O.
Draftstop—Ventilators. Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
Draftrite—Gages. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Draftrite—Gages. Cole-Sewell Engineering Co., St. Paul, Minn.
Drainator—Traps. Coe Mfg. Co., Painesville, O.
Drain-Dri—Sump pumps. Yeomans Bros. Co., Chicago, Ill.
Draintrol—Traps. Schaub Engineering Co., Fred H., Chicago, Ill.
Dresserell—Fittings. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Dricooler—Heat exchangers. Marley Co., Inc., The, Kansas City, Mo.
Drifilter—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Dri-Pipe—Insulation. Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.
Dripump—Pumps. Peerless of America, Inc., Chicago, Ill.
Drive-IT—Hangers and supports, welders. Powder Power Tool Corp., Portland, Ore.
Dri-vent—Radiator air valves. Frank D. Riggio Co., Rutherford, N. J.
Dry-Ex—Water chillers. Acme Industries, Inc., Jackson, Mich.
Dryfol—Building insulation. Reflectal Corp., New York, N. Y.
Dry-Ice—Refrigerants. Pure Carbonic, Inc., Div. of Air Reduction Co., Inc., New York.
Drynamic—Dehumidifiers. Cargocaire Engineering Corp., New York, N. Y.
Dry-paC—Insulation. Ric-WiL Co., Cleveland.
Dryvin—Expansion bolts. Star Expansion Bolt Co., New York, N. Y.
Dualarc—Arc Welders. Electric Arc, Inc., Newark, N. J.
Dual-Clone—Dust collectors. Day Co., The, Minneapolis, Minn.
Dual-Dial—Gages. Rochester Mfg. Co., Inc., Rochester, N. Y.
Dual-A-Fire—Burners. Automatic Firing Corp., St. Louis, Mo.
Dualene—Fuel oil treatment. Allen Co., Robert G., Mechanicsville, N. Y.
Dualsteel—Unions. Rockwood Sprinkler Co., Worcester, Mass.
Dualvent—Roof ventilators. Octagon Ventilator Co., Chicago, Ill.
Duboth—Boiler water treatment. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Duclone—Dust collectors. Ducon Co., Mineola, N. Y.
Duco—Enamels and lacquers, du Pont de Nemours & Co., (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Ductatherm—Thermostats. Mercoid Corp., The, Chicago, Ill.
Ducturns—Vanes. Tuttle & Bailey, Inc., New Britain, Conn.
Ductype—Fans. South Bend Air Products, Inc., South Bend, Ind.
Dulrae—Electrical radiant heating conductors. Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Dulux—Enamels and lacquers. du Pont de Nemours & Co., (Inc.) E. I., Fabrics & Finishes Dept., Wilmington, Del.
Dum Dum—Sealing compounds. Arco Co., The, Cleveland, O.
Duo Blo—Air heaters. American Furnace Co., St. Louis, Mo.
Duoflo—Pipe line strainers. Sheffler-Gross Co., Philadelphia, Pa.
Duo-Stat—Heating systems, thermostats. Johnson Service Co., Milwaukee, Wis.
Duotrol—Regulators. Automatic Control Co., St. Paul, Minn.
Duplex—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Duplex—Pipe cutting machines. Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
Durabel—Coatings. Perolin Co., Inc., Chicago, Ill.
Durabilt—Observation ports, conveyors. Chicago Fire Brick Co., Chicago, Ill.
DuraBilt—Registers. Auer Register Co., Cleveland, O.
Duradiant—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Dura-Flex—Registers. Auer Register Co., Cleveland, O.
Duraflex—Stokers. Canton Stoker Corp., Canton, O.
Dura-Line—Registers. Auer Register Co., Cleveland, O.
DuraSpeed—Sprinkler heads. Grinnell Co., Inc., Providence, R. I.
Duratex—Protective coatings. National Pipe Coatings, Inc., Huntington Park, Calif.

Durco—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Durcopump—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Durex—Bearings. Moraine Products Div., General Motors Corp., Dayton, O.
Durichlor—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Duridine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Durimet—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Durobrace—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Duro Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Dustex—Dust collectors. Dust Filter Co., Chicago, Ill.
Dust King—Dust collectors. Dust Filter Co., Chicago, Ill.
Dustkop—Dust collectors. Aget-Detroit Co., Ann Arbor, Mich.
Dust-Stop—Air Filters. Owens-Corning Fiberglas Corp., Toledo, O.
Dust-Trap—Filters. Morf Industries, Inc., Staten Island, N. Y.
Dustube—Dust collectors. American Wheelabrator & Equipment Corp., Mishawaka, Ind.
Dutch Boy—Solder. National Lead Co., New York, N. Y.
Duxbak—Leather belting and packing. Schieren Co., Chas. A., New York, N. Y.
Dux-Sulation—Insulation. Grant Wilson, Inc., Chicago, Ill.
Dynaflow—Fans. South Bend Air Products, Inc., South Bend, Ind.
Dyna-Line—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.
Dynamaster—Recorders. Bristol Co., The, Waterbury, Conn.
Dyna-Speed—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.
Dynetric—Balancing equipment. Gisholt Machine Co., Madison, Wis.

E.A.D.—Motors. Eastern Air Devices, Inc., Brooklyn, N. Y.
E-C—V belts. Goodyear Tire & Rubber Co., Akron, O.
E C & M—Motor controls, switches. Electric Controller & Mfg. Co., Cleveland, O.
EMD—Blowers. L. J. Wing Mfg. Co., Linden, N. J.
E-Z—Registers, regulators. Acme Mfg. Co., Philadelphia, Pa.
E.Z.—Hangers or brackets, soot destroyers. Healy Ruff Co., St. Paul, Minn.
Eastern—Tanks. Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Easy-Flo—Solder. Handy & Harman, New York, N. Y.
Ebko—Conduit, exchangers, pipe. Kaiser Co., E. B., Chicago, Ill.
Eclipse—Reciprocating compressors. Frick Co., Waynesboro, Pa.
Econofeed—Pumps, systems. Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Econ-O-Flow—Furnaces. U. S. Machine Corp., Lebanon, Ind.
Econ-O-Matic—Motor bases. American Pulley Co., The, Philadelphia, Pa.
Economist—Boilers. Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Economite—Commercial and industrial gas burners. Mid-Continent Metal Products Co., Chicago, Ill.
Economizer—Nozzles. Bahnson Co., Winston-Salem, N. C.
Economy—Boilers. International Heater Co., Utica, N. Y.
Economy—Unit ventilators. Arex Co., Chicago, Ill.
Econostat—Heating systems. Barber-Colman Co., Rockford, Ill.
Econotherm—Boilers. Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Econovent—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.
Eddy—Stokers. Eddy Stoker Corp., Chicago, Ill.
Edgeseal—Air filters. Wilson & Co., Inc., Chicago, Ill.
Edgetallic—Gaskets. Darcoid Co., Inc., New York, N. Y.
Effico—Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
"88"—Pipe covering. Eagle-Picher Co., Cincinnati, O.
Elastic Metallic—Packing. Chesterton Co., A. W., Everett, Mass.
Elasto Rib—Vibration isolating bases. Korfund Co., Inc., Long Island City, N. Y.
Electranik—Indicator-controllers. Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Electric Filter Watchman—Gages. Herbusch Corp., The, St. Louis, Mo.
Electrifugal—Centrifugal pumps. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electriglass—Conductors. Appleman Glass Works, Bergenfield, N. J.
Electro-Airmat—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Cell—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electroflo—Valves. Hays Mfg. Co., Erie, Pa.
Electrofluid—Hydraulic speed changers. Link-Belt Co., Philadelphia, Pa.
Electro-Hot—Heaters. Red Spot Electric Co., Tacoma, Wash.
Electro-Klean—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Mist Collector—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Pl—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.
Electro-Rod—Pipe cleaning machines. Spartan Tool Co., Chicago, Ill.
Electro-Sheet—Sheets. American Brass Co., Waterbury, Conn.
Electro-Shield—American Cladmetals Co., Carnegie, Pa.
Electroweld—Welders. Electric Arc., Inc., Newark, N. J.
Electro-Wind—Ventilators. Allen Ventilator Div., Production Planning Co., Rochester, Mich.
Electrunite—Stainless steel tubing and pipe, tubing benders. Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
Elesco—Superheaters. Combustion Engineering-Superheater, Inc., New York, N. Y.
Elgex—Steam system treatment. Elgin Softener Corp., Elgin, Ill.
Elgin—Arc welders. Borm Mfg. Co., Elgin, Ill.
Elgin—Louvers and shutters. Elgo Shutter & Mfg. Co., Detroit, Mich.
Elm—Dampers. Elgo Shutter & Mfg. Co., Detroit, Mich.
Elsco—Blowers, compressors, pumps, valves. Electric Sprayit Co., The, Sheboygan, Wis.
Embee—Cement and compounds. Montgomery Bros., San Francisco, Calif.
Emco—Meters, regulators. Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
Emergency—Traps. Wright-Austin Co., Detroit, Mich.
Empire—Water meters. Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh.
Enamel-Kote—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Enco—Burners, regulators, cooling units. Engineer Co., New York, N. Y.
Enduro—Sheets, tubing, pipe. Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
Enduro—Unions. Jefferson Union Co., Inc., New York, N. Y.
Entrained Combustion—Gas burners. Mettler Co., Inc., The, Los Angeles, Calif.
Equatemp—Balancing valves. Ohio Brass Co., Mansfield, O.
Equiflo—Valves. Grinnell Co., Inc., Providence, R. I.
Eroduct—Insulation. Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Esco—Fittings, flanges, pipe, tubing. Electric Steel Foundry Co., Portland, Ore.
Ermeto—Fittings. Weatherhead Co., The, Cleveland, O.
Esna—Nuts. Elastic Stop Nut Corp. of America, Union, N. J.
Esso—Oil burners, heaters. Gilbert & Barker Mfg. Co., West Springfield, Mass.
Esso Bond—Cement, refractories. Ramtite Co., The, Chicago, Ill.
Eutec-Arc—Arc welders, welding and cutting apparatus. Eutectic Welding Alloys Corp., New York, N. Y.
EuteCrod—Welding compounds, rods, solder. Eutectic Welding Alloys Corp., New York.
Eutector—Welding compounds. Eutectic Welding Alloys Corp., New York, N. Y.
EutecTorch—Torches, welding and cutting apparatus. Eutectic Welding Alloys Corp., New York, N. Y.
EutecTrode—Welding electrodes. Eutectic Welding Alloys Corp., New York, N. Y.
Evactor—Pumps. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Evapotrol—Valves. Alco Valve Co., St. Louis, Mo.
Evanaction—Valves. Taylor Instrument Companies, Rochester, N. Y.
Everflex—Hose, coils, and tubing. Everhot Products Co., Chicago, Ill.
Everjet—Coatings, Barrett Div., Allied Chemical & Dye Corp., New York, N. Y.
Everlasting—Bolts and studs. H. M. Harper Co., Morton Grove, Ill.
Eversharp—Cutters. Everhot Products Co., Chicago, Ill.
Evertite—Clamps. Everhot Products Co., Chicago, Ill.
Evrtyte—Valves. Strong, Carlisle & Hammond Co., Cleveland, O.
Excel—Unions. Jefferson Union Co., Inc., New York, N. Y.
Excelsior—Pumps. Foster Pump Works, Inc., Brooklyn, N. Y.
Excelso—Water heaters. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Exhaustair—Fans. New York Blower Co., Chicago, Ill.
Exidust—Dust collectors. Lamson Corp., Blower Div., Syracuse, N. Y.
Expando—Tube expanders. Knuth Engineering Co., Chicago, Ill.
Extra Dry Esotoo—Liquid sulphur dioxide. Virginia Smelting Co., West Norfolk, Va.
Eye-Hye—Indicators. Reliance Gauge Column Co., Cleveland, O.
E-Z—Cutters. Quijada Tool Co., Inc., Los Angeles, Calif.
Ez-arc—Arc welders. Will-Weld Mfg. Co., Inc., Omaha, Neb.
E-Z-On—Regulators. Gerrett Corp., M. A., Milwaukee, Wis.
E-Z See—Glasses. Remco, Inc., Zelienople, Pa.
Ezy-Kleen—Strainers. Blackmer Pump Co., Grand Rapids, Mich.

F & E—Stokers. Flynn & Emrich Co., Baltimore, Md.
FS—Bellows. Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
F & T—Boilers. Farrar & Trefts, Buffalo, N. Y.
Fabrikated—Grilles, registers. Independent Register Co., Cleveland, O., New York, N. Y.
Faessler—Tube expanders, tube flaring tools. Key Co., East St. Louis, Ill.
Fairco-Braze—Valves. Fairbanks Co., New York, N. Y.
Faircoseal—Valves. Fairbanks Co., New York, N. Y.
Fan-Air—Gas burners. Mettler Co., Inc., The, Los Angeles, Calif.
Fanmix—Burners. Coppus Engineering Corp., Worcester, Mass.
Fan-Pac—Fans. DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Far-Air—Air conditioning units, filters, humidifiers. Farr Co., Los Angeles, Calif.
Farragut—Packing. Darcoid Co., Inc., New York, N. Y.
Fast's—Couplings. Koppers Co., Inc., Pittsburgh, Pa.
Favorite—Ratchet wrenches. Greene, Tweed & Co., North Wales, Pa.
Featherfin—Heating and cooling surface. Wing Mfg. Co., L. J., Linden, N. J.
Featherweight—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Featherweight—Unit heaters. Wing Mfg. Co., L. J., Linden, N. J.
Feed-Rator—Chemical feeders. Fischer & Porter Co., Hatboro, Pa.
Fel-Pro—Gaskets, packing. Felt Products Mfg. Co., Chicago, Ill.
Felt Cote—Metal Sheets. American Steel Band Co., Pittsburgh, Pa.
Fenn's Rotary—Ventilators. Waverly Heating Supply Co., Boston, Mass.
Ferrenewo—Valves. Lunkenheimer Co., Cincinnati, O.
Ferrodex—Compounds. MacDermid Chemical Co., Bristol, Conn.
Ferro-Therm—Insulation. American Flange & Mfg. Co., New York, N. Y.
Ferroweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Fiberglas—Insulation. Owens-Corning Fiberglas Corp., Toledo, O.
Fiberlite—Insulation. Insulite Co., Minneapolis, Minn.
Fibron—Plastic tubing. Irvington Varnish & Insulator Co., Irvington, N. J.
Filmflo—Deaerators. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Filterpure—Cooling surface, unit coolers. Betz Corp., Hammond, Ind.
Fil-Thru—Gages. Applied Mechanics Co., Boston, Mass.
Filt-R-Stil—Water treatment. American Cyanamid & Chemical Corp., New York, N. Y.
Filter Watchman—Air filter gages. Research Products Corp., Madison, Wis.
Findlay—Stokers. Central Rubber & Steel Corp., Findlay, O.
Fine-Screen—Strainers. Yarnall-Waring Co., Philadelphia, Pa.
Fin-Fans—Oil coolers. Fluor Corp., Ltd., The, Los Angeles, Calif.
Fin-Flex—Registers. Auer Register Co., Cleveland, O.
Finfold—Cooling surface. Pleasantaire Corp., Washington, D. C.
Finmaster—Radiation. Smith Co., Inc., H. B., The, Westfield, Mass.
Finnflex—Bases and pads, absorbers. Finn & Co., New York, N. Y.
Firecrete—Refractories. Johns-Manville, New York, N. Y.
Firefoil—Insulating panel. Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Fire-Guard—Industrial stokers. Eddy Stoker Corp., Chicago, Ill.
Fire-Hearth—Refractories. Fireline Stove & Furnace Lining Co., Chicago, Ill.
Fireite—Furnace cement; refractories. Johns-Manville, New York, N. Y.
Fireset—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Fire Tender—Stokers. Holcombe & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Fireye—Flame failure controls, systems. Combustion Control Corp., Cambridge, Mass.
Firma—Ventilators. Hirschman-Pohle Co.,

Inc., LeRoy, N. Y.
Firomatic—Filters, gages, links, switches, valves. Morse-Smith-Morse, Inc., Watertown, Mass.
Flame Buster—Spray nozzles. Grinnell Co., Inc., Providence, R. I.
Flame-otrol—Controls. Wheelco Instruments Co., Chicago, Ill.
Flange-Jacks—Separators. Williams & Co., J. H., Buffalo, N. Y.
Flaremaster—Benders. Everhot Products Co., Chicago, Ill.
Flash-Off—Welding compounds. Acme White Lead & Color Wks., Detroit, Mich.
Flat-Belt—Pulleys and sheaves. The American Pulley Co., Philadelphia, Pa.
Flatjet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Fleetweld—Welding electrodes. Lincoln Electric Co., Cleveland, O.
Fleetwelder—Welders. Lincoln Electric Co., Cleveland, O.
Fleet-X—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Flex—Nipples. Techniflex Corp., Port Jervis, N. Y.
Flexarc—Arc welders. Westinghouse Electric Corp., Pittsburgh, Pa.
Flexaust—Hose. American Ventilating Hose Co., New York, N. Y.
Flexcell—Bases and pads. Celotex Corp., The, Chicago, Ill.
Flexcord—Drives. Gates Rubber Co., Denver.
Flexfast—Hose clamps. Flexible Tubing Corp., Guilford, Conn.
Flexflyte—Duct fittings. Flexible Tubing Corp., Guilford, Conn.
Flexiblac—Protective coatings. Samuel Cabot, Inc., Boston, Mass.
Flexidur—Nozzles. Bahnson Co., Winston-Salem, N. C.
Flexiflo—Diffusers. Universal Diffuser Corp., New York, N. Y.
Flexfelt—Insulation. National Gypsum Co., Buffalo, N. Y.
Flex-i-liner—Rotary pumps. Vanton Pump Corp., New York, N. Y.
Flexloc—Lock nuts. Standard Pressed Steel Co., Jenkintown, Pa.
Flexodisc—Expansion joints. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Flexon—Bellows. Chicago Metal Hose Corp., Maywood, Ill.
Flexpansion—Fittings and hose. Techniflex Corp., Port Jervis, N. Y.
Flexpin—Couplings. Smith & Serrell, Inc., Newark, N. J.
FlexRing—Couplings. Smith & Serrell, Inc., Newark, N. J.
Flextite—Gate valves. Ohio Brass Co., Mansfield, O.
Flex-Tube—Analyzers, gages, manometers, switches, pilot tubes. Dwyer Mfg. Co., F. W., Chicago, Ill.
Floatrol—Switches, regulators. Automatic Control Co., St. Paul, Minn.
Flo-Controls—Fittings. W-H Engineering Co., Chicago, Ill.
Floetless—Sump pumps. Imperial Brass Mfg. Co., Chicago, Ill.
Flo-Gage—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Flo-Klean—Filters, strainers. Cuno Engineering Corp., Meriden, Conn.
Flo-Master—Valves. General Heaters & Regulators Co., Chicago, Ill.
Flo-Matic—Conveyors, Stokers. American Coal Burner Co., Chicago, Ill.
Florite—Air velocity meters. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Flo-Scope—Meters. Selas Corp. of America, Philadelphia, Pa.
Flotrol—Humidifiers, valves. Cleveland Humidifier Co., Cleveland, O.
Flo-watch—Flow meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Flow-Cold—Water chillers. Acme Industries, Inc., Jackson, Mich.
Flowline—Pipe fittings. Welding Fittings Corp., New Castle, Pa.
Flowrator—Meters. Fischer & Porter Co., Hatboro, Pa.
Flow-Temp—Air conditioning Units. Acme Industries, Inc., Jackson, Mich.
Flualyzer—Analyzers. Engelhard, Inc., Chas., Newark, N. J.
Fluid Joists—Coils. Fricke, Fred J., Albuquerque, N. M.
Fluidyne—Pumps. Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Flush-Kleen—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.
Flux-Stik—Solder and fluxes. Lake Chemical Co., Chicago, Ill.
Foambuster—Compounds. Cannon Chemical Co., Inc., Cambridge, Mass.
Foamglas—Insulation. Armstrong Cork Co., Lancaster, Pa.
Foamglas—Insulation. Pittsburgh Corning Corp., Pittsburgh, Pa.
Foamglas—Insulation. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Force-Flo—Circulators, fittings, heaters, regulators, tanks. Kehm Corp., The, Chicago.
Form-A-Gasket—Cement and compounds. Permatex Co., Inc., Brooklyn, N. Y.
Formet—Water treatment. Perolin Co., Inc., Chicago, Ill.
4-Point—Control systems. Perfex Corp., Milwaukee, Wis.
"400" Series—Heaters. Fitzgibbons Boiler Co., Inc., New York, N. Y.
4-Star—Adhesive tape. Johns-Manville, New York, N. Y.
Fox—Regulators. Climax Metal Products Co., Cleveland, O.
Fracto-Crete—Refractories. Ramtite Co., The, Chicago, Ill.
Francke—Flexible couplings. Waldron Corp., John, New Brunswick, N. J.
Francke Parts—Couplings. Smith & Serrell, Inc., Newark, N. J.
Franzite—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Free-Aire—Air conditioning units, heaters. Kehm Corp., The, Chicago, Ill.
Free-Flow—Ventilators. Burt Mfg. Co., Akron, O.
Fre-Flo—Strainers. Fisher Governor, Marshalltown, Ia.
Fresh Air Maker—Propeller fans, units. Schwitzer-Cummins Co., Indianapolis, Ind.
Frevent—Valves. Bridgeport Brass Co., Bridgeport, Conn.
Frictionized—Belting. Baldwin Belting, Inc., New York, N. Y.
Frigid—Propeller fan blades and fans, dehumidifiers, welding fume exhausters, paint spray booths, air conditioning units, ventilators. Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Frigistat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Frigitower—Cooling towers. Thermal Industries, San Francisco, Calif.
Frost-Tite—Fittings. Remco, Inc., Zelienople, Pa.
Fuelguard—Commercial and industrial burners. Fuelguard Co., Dallas, Tex.
Fuel Saver—Boilers. International Boiler Works, East Stroudsburg, Pa.
Fueltone—Fuel oil treatment. Ampion Corp., Long Island City, N. Y.
Fulflo—Filters. Commercial Filters Corp., Boston, Mass.
Fulljet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Fulscope—Recorders, recorder-controllers, regulators. Taylor Instrument Companies, Rochester, N. Y.
Fuseair—Air diffusers. Aladdin Heating Corp., Oakland, Calif.
Fusomatic—Links. Preferred Utilities Mfg. Corp., New York, N. Y.
Fybr-Tech—Gaskets and sheets. Technical Ply-Woods, Chicago, Ill.
Fyr-Feeder—Stokers. American Coal Burner Co., Chicago, Ill.
Fyrite—Analyzers. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Fyritec—Recorders. Cole-Sewell Engineering Co., St. Paul, Minn.

GB—Fans. General Blower Co., Morton Grove, Ill.
G. B. C.—Fans, gages, regulators. General Blower Co., Inc., Philadelphia, Pa.
G-E—Compressors, condensers, thermostats. General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
G-Fin—Cooling and heating surface. Griscom-Russell Co., The, New York, N. Y.
GIL—Filters, regulators. Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
GIL Governoret—Valves. Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
GIL No-Hum—Check valves. Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
G. P.—Smoke density recorders, analyzers, combustion control systems. General Power Plant Corp., New York, N. Y.
G-R—Aftercoolers, oil coolers, water chillers, regulators. Griscom-Russell Co., The, New York, N. Y.
Gaco—Couplings. Gates Engineering Co., Wilmington, Del.
Gaco-Neoprene—Coatings, fittings, pipe. Gates Engineering Co., Wilmington, Del.
Galbestos—Sheet metal. Robertson Co., H. H., Pittsburgh, Pa.
Galongage—Gages. Applied Mechanics Co., Boston, Mass.
Galv-O-Zinc—Coatings. Blue Ridge Talc Co., Inc., Henry, Va.
Gasgun—Torches. Century Aircraft, Los Angeles, Calif.
Gas-A-Fire—Burners. Automatic Firing Corp., St. Louis, Mo.
Gas Pak—Welding rod. Marquette Mfg. Co., Minneapolis, Minn.
Gast—Filters, separators. Johnson Corp., The, Three Rivers, Mich.
Gasteam—Radiators. Clow & Sons, James B., Chicago, Ill.
Gasweld—Torches, welding rod and apparatus. Liquid Carbonic Corp., The, Chicago, Ill.
Geddes—Radiation. Fowler & Wolfe Radiator Co., Norristown, Pa.
Gehl—Stokers. Eddy Stoker Corp., Chicago, Ill.
Gemaco—Compressors. General Machinery Co., Spokane, Wash.
Gemco—Bolts, clamps, hangers and supports, fasteners. Goodloe E. Moore, Inc., Danville, Ill.
Gemco—Air conditioning units. General Engineering & Mfg. Co., St. Louis, Mo.
Gemware—Hygrometers, psychrometers, thermometers, G. M. Mfg. Co., New York, N. Y.
Genuine Stillson—Wrenches. Walworth Co., New York, N. Y.
Gerotor—Rotary pumps. May Oil Burner Div., Gerotor May Corp., Baltimore, Md.
Giant—Radiation. John J. Nesbitt, Inc., Philadelphia, Pa.
Giant—Radiator hangers. Western Hanger Co., San Francisco, Calif.
Gilbarco—Compressors, oil burners, heaters, Pumps. Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gilsonite—Protective coatings. Ohmlac Paint & Refining Co., Inc., New York, N. Y.
Gilt Edge—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Gland-Pakt—Expansion joints. Yarnall-Waring Co., Philadelphia, Pa.
Glasweld—Fiber pipe. United States Plywood Corp., New York, N. Y.
Globe—Clamps, plates, hangers and supports. Hupp Corp., Globe Stamping Div., Cleveland, O.
Glo-Tech—Glass pipe. Fischer & Porter Co., Hatboro, Pa.
Glowan—Gas burners. Martin Co., Inc., J. O., San Francisco, Calif.
Gloweld—Welded steel tubing. Globe Steel Tubes Co., Milwaukee, Wis.
Glucosates—Compounds, steam system treatment. Haering & Co., Inc., D. W., San Antonio, Tex.
Glycolator—Sterilizing units. Iron City Chemical Co., Valencia, Pa.
Glycolator—Sterilizing units. Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Glycosol—Sterilizing units. Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Glycosol—Sterilizing units. Iron City Chemical Co., Valencia, Pa.
Gohi—Sheets. Newport Rolling Mill Co., Newport, Ky.
Gold Bond—Insulation. National Gypsum Co., Buffalo, N. Y.
Goodyearite—Packing. Goodyear Tire & Rubber Co., Akron, O.
Gordon—Pipe and tubing benders. Pacific Machine & Iron Wks., Tacoma, Wash.
Grad-U-Motor—Damper operators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Gradustat—Regulators, thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Gradutrol—Diaphagm valves, radiator orifices. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Grand Rapids—Boiler vacuum cleaners. Doyle Vacuum Cleaner Co., Grand Rapids, Mich.
Granodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Granodraw—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Graycote—Cement and compounds. Chicago Gasket Co., Chicago, Ill.
Graylite—Insulation. Insulite Co., Minneapolis, Minn.
Greastop—Air filters. Air-Maze Corp., Cleveland, O.
Greenspot—Hose clamps. Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Grid—Cooling and heating surface condensers, radiation, unit heaters. Murray Mfg. Co., D. J., Wausau, Wis.
Gripzins—Expansion bolts. Star Expansion Bolt Co., New York, N. Y.
Gritseald—Rotary pumps. St. Louis Tool Co., St. Louis, Mo.
Gruvagrip—Couplings. Gustin-Bacon Mfg. Co., Kansas City, Mo.
Guardian—Gaskets. Garlock Packing Co., Palmyra, N. Y.
Gunchrome—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Gundol—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Gunmix—Refractories. Basic Refractories, Inc., Cleveland, O.
Gun Pakt—Expansion joints. Yarnall-Waring Co., Philadelphia, Pa.
Guthfan—Fans. Guth Co., Edwin F., St. Louis, Mo.
Gyrol Fluid Drive—Speed changer. American Blower Corp., Detroit, Mich.
Gyroseals—Shaft seals. Cook Electric Co., Chicago, Ill.

H & C—Grilles, registers. Hart & Cooley Mfg. Co., Holland, Mich.
H-O-H—Compounds, feeders, steam system and water treatment. Haering & Co., Inc., D. W., San Antonio, Tex.

HS—Fans. American Blower Corp., Detroit, Mich.
Hammerkraft—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Hammerlin—Coatings, enamels. Interchemical Corp., Newark, N. J.
Hammermill—Belting. Goodyear Tire & Rubber Co., Akron, O.
Hammer-on—Regulators. Air Control Products, Inc., Coopersville, Mich.
Hammer-Set—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Hancock—Valves. Manning, Maxwell & Moore, Inc., Stratford, Conn.
Handy—Benders. Holsclaw Bros., Inc., Evansville, Ind.
Handy—Ducts and duct fittings. Meyer & Bro. Co., F., Peoria, Ill.
Handy Andy—Vise stands. Western Wire Products Co., St. Louis, Mo.
Hardweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Hartmann—Heaters. Montgomery Bros., San Francisco, Calif.
Hazleton—Pumps, strainers, valves. Barrett, Haentjens & Co., Hazleton, Pa.
Heacon—Dampers. Thermix Corp., The, Greenwich, Conn.
Heath-Crete—Refractories. Quigley Co., Inc., New York, N. Y.
Heart-Oak—Belting. Graton & Knight Co., Worcester, Mass.
Heat-aid—Refractories. Pyrolite Products Co., Cleveland, O.
Heat Extractor—Boilers. National Radiator Co., The, Johnstown, Pa.
Heatomat—Boilers. Richmond Radiator Co., New York, N. Y.
Heat-O-Meter—Temperature regulators, thermostats. Miller-Harris Instrument Co., Milwaukee, Wis.
Heat-Pak—Boilers, heaters. Aldrich Co., The, Wyoming, Ill.
Heat-Rite—Registers. Auer Register Co., Cleveland, O.
Heatsum—Conductors. Roberson Co., L. N., Seattle, Wash.
Heat-Tite—Insulating cement. Ramtite Co., The, Chicago, Ill.
Heat-Valve—Ventilators. Swartwout Co., Cleveland, O.
Heat-X—Heat exchangers, aftercoolers, chillers, coolers, heaters, condensers. Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Heat-X-Fin—Finned surface and tubing. Heat-X-Changer Co., Inc., The, Brewster, N. Y.
Heet-Master—Process and storage tanks. Aeroil Products Co., Inc., South Hackensack, N. J.
Heliarc—Welders. Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Helical—Tubing. Rome-Turney Radiator Co., Rome, N. Y.
Heliflow—Aftercoolers, chillers, oil coolers, heat exchangers, water heaters. Graham Mfg. Co., Inc., New York, N. Y.
Hellite—Refractories. Johns-Manville, New York, N. Y.
Herco—Arc welders. Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Herculoy—Tubing. Revere Copper and Brass, Inc., New York, N. Y.
Herecrol—Protective Coatings. Heresite & Chemical Co., Manitowoc, Wis.
Hev-E-Oil—Burners. Cleaver-Brooks Co., Milwaukee, Wis.
Hi-Cap—Furnaces. Syncromatic Corp., Watertown, Wis.
Hi-Duty—Tubing cutters, flaring tools, Imperial Brass Mfg. Co., Chicago, Ill.
Hi-Duty—Combustion chambers. Monogram Products Co., Inc., Philadelphia, Pa.
Hi-Ef—Filters, heads. Anderson Co., V. D., The, Cleveland, O.
Hi-Fin—Surfaces, tubing. Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Highflex—Belting. Goodrich Co., B. F., Akron, O.
High - Ten - 500—Solder. Industrial Service Laboratories, Milwaukee, Wis.
High Test—Water heaters. Burnam Corp., Boiler Div., Irvington, N. Y.
Hi-Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Hilger—Chillers, refrigerating compressors, unit coolers, unit air conditioners, valves. XL Refrigerating Co., Inc., Chicago, Ill.
Hi-Lift—Pumps. Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Hi-Lo—Alarms. Yarnall-Waring Co., Philadelphia, Pa.
Hi-Lo—Pumps. Yeomans Bros. Co., Chicago, Ill.
Hi-Lo-Graph—Recorders. Yarnall-Waring Co., Philadelphia, Pa.
Hi-Peak—Water chillers. Acme Industries, Inc., Jackson, Mich.
Hirae—Electric heating conductors. Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Hi-Seal—Cement and compounds. Greene, Tweed & Co., North Wales, Pa.
Hi-Speed—Welding and cutting apparatus. Dockson Corp., Detroit, Mich.
Hi-Spra—Spray nozzles. Thermal Industries, San Francisco, Calif.
Hitchings—Boilers. Burnham Corp., Boiler Div., Irvington, N. Y.
Hi - Temp—Insulation. Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Hi-Temp—Insulation cement. Zonolite Co., Chicago, Ill.
Hi-Test—Boilers. Kewanee Boiler Co., Kewanee, Ill.
Hi-Value—Adhesive tape. Johns-Manville, New York, N. Y.
Hoffman—Water heaters. Clayton & Lambert Mfg. Co., Louisville, Ky.
Hoffman—Draft controls. Salina Metal Products Co., Salina, Kan.
Holdtite—Solder. American Brass Co., Waterbury, Conn.
Holgun—Drills. Black & Decker Mfg. Co., Towson, Md.
Holiday—Air conditioning units. Comfort Products Corp., Dallas, Tex.
Hollo-Tech—Doors and panels. Technical Ply-Woods, Chicago, Ill.
Holt—Strainers, tube cleaners. Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Holtite—Bolts, screws. Continental Screw Co., New Bedford, Mass.
Holtite—Clamps. Yarnall-Waring Co., Philadelphia, Pa.
Honeycomb—Filters. Wilson & Co., Inc., Chicago, Ill.
Horton—Tanks. Chicago Bridge & Iron Co., Chicago, Ill.
Hot Boy—Unit heaters. Coroaire Heater Corp., The, Cleveland, O.
Hot Shot—Pumps. Yeomans Bros. Co., Chicago, Ill.
Hot Spot—Preheaters. Rempe Co., Chicago, Ill.
Hot Spot—Spot welders. Acme Electric Welder Co., Los Angeles, Calif.
Houghto-Clean—Boiler cleaning compounds. Houghton & Co., E. F., Philadelphia, Pa.
Hovalco—Valves. Homestead Valve Mfg. Co., Coraopolis, Pa.
Huber—Stokers. Flynn & Emrich Co., Baltimore, Md.
Humiclean—Cleaning compounds, water treatment. Carolina Aniline & Extract Co., Charlotte, N. C.
Humidair—Humidifiers. Skilbeck Mfg. Co., Kenosha, Wis.
Humidigraph—Humidity recorders. Bristol Co., Waterbury, Conn.
Humidiguide—Hygrometers. Taylor Instrument Companies, Rochester, N. Y.
Humidostat—Humidistats. Johnson Service Co., Milwaukee, Wis.
Humiduct—Unit air conditioners. Bahnson Co., Winston-Salem, N. C.
Humid - U - Stat—Humidistats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Humi-Temps—Unit air coolers. Larkin Coils, Atlanta, Ga.
Hum-O-Zone—Room type humidifiers. Daffin Mfg. Co., Lancaster, Pa.
Humphrey—Heaters. General Gas Light Co., Kalamazoo, Mich.
Hurricane—Heaters. Zink Co., John, Tulsa, Okla.
Hydralt—Protective coatings. Flintkote Co., The, New York, N. Y.
Hydramotor—Valves. General Controls Co., Glendale, Calif.
Hydro—Recorders. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Hydro-Clone—Dust collectors, welding fume exhausters. Whiting Corp., Harvey, Ill.
Hydro-Flo—Heaters, heating systems, circulators, regulators. Bell & Gossett Co., Morton Grove, Ill.
Hydro-Foam—Dust collectors. Mahon Co., R. C., Detroit, Mich.
Hydro-Foil—Pumps. Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Hydroline—Shaft seals. Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Hydro-Matic—Connectors. Mechanical Products Corp., Chicago, Ill.
Hydron—Bellows. Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass.
Hydro Therm—Heaters, heating systems. Hook & Ackerman, Inc., New York, N. Y.
Hydro-Vari—Hydraulic coupling changers. Twin Disc Clutch Co., Rockford, Ill.
Hydro-Whirl—Dust collectors, spray booths. Peters-Dalton, Inc., Detroit, Mich.
Hydryer—Dehumidifiers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Hy-Duty—Blower wheels, fans. Schwitzer-Cummins Co., Indianapolis, Ind.
Hynes—Heaters. Martin-Quaid Co., Philadelphia, Pa.
Hy-Power—Shears and snips. Wiss & Sons Co., J., Newark, N. J.
Hy-Pro—Taps. Continental Screw Co., New Bedford, Mass.
Hyrate—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Hy-Speed—Pipe vises. Munton Mfg. Co., Franklin Park, Ill.
Hytemp—Insulation. Armstrong Cork Co., Lancaster, Pa.
Hy-Temp—Cement, insulation. Keasbey & Mattison Co., Ambler, Pa.
Hytempite—Cement, refractories. Quigley Co., Inc., New York, N. Y.
Hy-Test—Water heaters, Smith Co., Inc., H. B., The, Westfield, Mass.

IMO—Pumps. De Laval Steam Turbine Co., Trenton, N. J.
I-R—Ingersoll-Rand, New York, N. Y.
IVCO—Ventilators. Iona Ventilator Co., Inc., Philadelphia, Pa.
Ice-Cel—Refrigeration accumulators. Dole Refrigerating Co., Chicago, Ill.
Icy-Flo—Accumulators. McQuay, Inc., Minneapolis, Minn.
Ideal—Blowers. Perfection Grate & Stoker Co., Springfield, Mass.
Ideal—Speed changers, pulleys and sheaves. Lovejoy Flexible Coupling Co., Chicago, Ill.
Ideal—Traps. Nason Co., Clarkston, Mich.
Immersatherm—Thermostats. Mercoid Corp., The, Chicago, Ill.
Impact—Nozzles. Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
Imperial—Air conditioning units. International Metal Products Co., Phoenix, Ariz.
Impregnated—Bases and pads. Celotex Corp., The, Chicago, Ill.
Impulse—Traps. Yarnall-Waring Co., Philadelphia, Pa.
Inco—Electrodes, nipples, flanges, pipe fittings, pipe, rod, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Inconel—Pipe, fittings, nipples, flanges, pipe, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Inconel—Tubing. Trent Tube Co., East Troy, Wis.
Indeeco—Heaters, pipe heating systems. Industrial Engineering & Equipment Co., St. Louis, Mo.
Indoor-Outdoor—Thermostats. White-Rodgers Electric Co., St. Louis, Mo.
IngAclad—Stainless clad sheets. Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
In-Hib-Co—Protective coatings. Haering & Co., Inc., D. W., San Antonio, Tex.
Inkstop—Air filters. Air-Maze Corp., Cleveland, O.
Inseal—Piston rings. Double Seal Ring Co., Fort Worth, Tex.
Ins-lite—Insulation. Insulite Co., Minneapolis, Minn.
Instant—Heaters, preheaters. Johnson Corp., The, Three Rivers, Mich.
InstOmatic—Couplings. Wiggins Oil Tool Co., Inc., E. B., Los Angeles, Calif.
Insulag—Insulation. Quigley Co., Inc., New York, N. Y.
Insulbrix—Refractories. Quigley Co., Inc., New York, N. Y.
Insulfil—Insulation. Refractory & Insulation Corp., New York, N. Y.
Insulwool—Insulation. General Insulating Products Co., Brooklyn, N. Y.
Insutape—Pipe insulation. Union Asbestos & Rubber Co., Chicago, Ill.
Insutube—Insulation. Union Asbestos & Rubber Co., Chicago, Ill.
Integral Jet—Burners. Stout & Sons, David, St. Louis, Mo.
Intensarc—Electrodes. National Carbon Co., Div. of Union Carbide & Carbon Corp., New York, N. Y.
Inter-Matic—Time switches. International Register Co., Chicago, Ill.
International—Liquid level gages. Applied Mechanics Co., Boston, Mass.
Involute—Spray nozzles. Yarnall-Waring Co., Philadelphia, Pa.
Ionaire—Ionization apparatus. General Ozone Corp., Chicago, Ill.
Ironset—Furnace cement. Fireline Stove & Furnace Lining Co., Chicago, Ill.
Ironweld—Compounds. Sight Feed Generator Co., West Alexandria, O.
Irv-o-lite—Plastic tubing. Irvington Varnish and Insulator Co., Irvington, N. J.
Isomodes—Bases and pads, vibration isolating. M. B. Mfg. Co., The, New Haven, Conn.

J & C—Burners, fans, furnaces, heaters. Jackson & Church Co., Saginaw, Mich.
J F S—Speed changers. Stephens-Adamson Mfg. Co., Aurora, Ill.
J-M—Gaskets, bases and pads, cement, tape. Johns-Manville, New York, N. Y.
J-M Ball—Floats, traps. Cryer Trap & Valve Co., Inc., New York, N. Y.
J O Line—Wrenches, valves. J O Mfg. Co., South Gate, Calif.
Jacobus—Valves. Majot Automatic Machine Co., Inc., East Orange, N. J.
Janitrol—Boilers, burners, heaters, systems. Surface Combustion Corp., Toledo, O.
Jarco—Unions, valves. Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Ject-O-Valve—Ventilators. Swartwout Co., Cleveland, O.
Jennings—Pumps, ejectors. Nash Engineer-

ing Co., South Norwalk, Conn.
Jetal—Protective coatings. Alrose Chemical Co., Providence, R. I.
Jetcote—Protective coatings. Watson-Standard Co., Pittsburgh, Pa.
Jiffy Clips—Hangers and supports. Minerallac Electric Co., Chicago, Ill.
Jiffy—Regulators. Parker-Kalon Corp., New York, N. Y.
Joas—Stainless steel fittings. J O Mfg. Co., South Gate, Calif.
John Crane—Boiler tube expanders, seals, packing. Crane Packing Co., Chicago, Ill.
Jointite—Insulation. Mundet Cork Corp., North Bergen, N. J.
Jorgensen—Pipe clamps. Adjustable Clamp Co., Chicago, Ill.
Junior—Radiation. Weil-McLain Co., Michigan City, Ind.
JusRite—Ducts and duct fittings. Corbman Bros., Inc., Philadelphia, Pa.

K—Fittings. Kuhns Brothers Co., Dayton, O.
K. A. T.—Compounds and water treatment. American K.A.T. Corp., Garwood, N. J.
K-B—Dampers, regulators. Kerentoff, G. L., Cincinnati, O.
K-Fin—Cooling and heating surface. Griscom-Russell Co., The, New York, N. Y.
K and M—Controls, strainers, traps, valves. Kieley & Mueller, Inc., North Bergen, N. J.
K-Master—Filters, traps, valves. Kaye & MacDonald, Inc., West Orange, N. J.
K-Shield—Boiler and pipe insulation. Robinson Industries, Coleman, Mich.
K-S-V—Ventilators. Kernchen Co., Chicago, Ill.
Kable Kord—Belting. Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Kane—Boilers. Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Kapco—Cement, sheets and board. Keystone Asphalt Products Co., Chicago, Ill.
Karbate—Carbon pipe, heat exchangers, pumps. National Carbon Co., Div. of Union Carbide & Carbon Corp., New York, N. Y.
Kasson—Motors. General Die and Stamping Co., New York, N. Y.
Kathabar—Dehumidifiers, unit air conditioners, Air washers. Surface Combustion Corp., Toledo, O.
KeyKast—Pipe fittings & flanges. Key Co., East St. Louis, Ill.
Kek—Compounds, steam and water treatments. Kenite Laboratory, Inc., Madison, N. J.
Keldur—Bases and pads. Hobsite Products Co., Harrison, N. J.
Kemtex—Water softener. MacDermid Chemical Co., Bristol, Conn.
Ken—Combustion chambers. Barclay, Inc., Robert, Chicago, Ill.
Kenbric—Soot destroyers. Kenite Laboratory, Inc., Madison, N. J.
Kentucky—Sheets. Newport Rolling Mill Co., Newport, Ky.
Keystone—Packaged steam boiler units. Erie City Iron Wks., Erie, Pa.
Keystone—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Key-Tite—Cement and compounds. Key Co., East St. Louis, Ill.
Kidskin—Packing. Darcoid Co., Inc., New York, N. Y.
Kil-Mos—Water treatment. Chemical Engineering Co., Dallas, Tex.
Kimsul—Insulation. Kimberly-Clark Corp., Neenah, Wis.
King-clip—Valves. Lunkenheimer Co., Cincinnati, O.
King Leak-Pruf—Gages. Oil Equipment Mfg. Corp., New Haven, Conn.
Kleen Air—Air filters. Kaye & MacDonald, Inc., West Orange, N. J.
Kleenflo—Unit air filters. Air-Maze Corp., Cleveland, O.
Kleen Tube—Heaters. Vapor Heating Corp., Chicago, Ill.
Klingtite—Belting. Goodyear Tire & Rubber Co., Akron, O.
Klixon—Temperature control valves, motor controllers. Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Klondike—Arc welders. Fern, Ralph, Scranton, Pa.
Klosd—Motors. Sterling Electric Motors, Inc., Los Angeles, Calif.
Knight-Ware—Pipe, prefabricated ducts, valves, ventilators. Knight, Maurice A., Akron, O.
Knock-Out—Arc welders, torches, drills. Lee Co., K. O., Aberdeen, S. D.
Kno-Draft—Air diffusers. Connor Engineering Corp., W. B., New York, N. Y.
Kold Board—Insulation. Baldwin-Hill Co., Trenton, N. J.
Kontrol Master—Air valves. Kieley & Mueller, Inc., North Bergen, N. J.
Kontrol Motor—Diaphragm valves. Kieley & Mueller, Inc., North Bergen, N. J.
Kooler-Aire—Commercial air conditioners. United States Air Conditioning Corp., Minneapolis, Minn.
Kool Master—Propeller fans. Air Equipment Co., Chicago, Ill.
Kool-Shade—Solar heat resisting screens. Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
Korda—Gaskets. Chicago Gasket Co., Chicago, Ill.
Korda-Seal—Packing. Chicago Gasket Co., Chicago, Ill.
Korector—Draft controls. Cole-Sewell Engineering Co., St. Paul, Minn.
Korolac—Protective coatings. Goodrich Co., B. F., Akron, O.
Koroseal—Plastic tubing, protective coatings. Goodrich Co., B. F., Akron, O.
Kromatrol—Colorimeters. Will Corp., Rochester, N. Y.
Krome Kote—Coatings. Wolfe-Kote Co., Inc., Sheboygan, Wis.
Kromik—Coatings. Sherwin-Williams Co., The, Cleveland, O.
Kulene 131—Refrigerants. Eston Chemicals, Inc., Los Angeles, Calif.
Kwikflux-Solder. Special Chemicals Corp., New York, N. Y.
Kwik-way—Regulators. Hart & Cooley Mfg. Co., Holland, Mich.
Kwik-Steam—Boilers. Littleford Bros., Inc., Cincinnati, O.
Kyram—Refractories and refractory cement. Quigley Co., Inc., New York, N. Y.

L. A.—Motors. The Louis Allis Co., Milwaukee, Wis.
L-R—Couplings. Lovejoy Flexible Couplings Co., Chicago, Ill.
Lamneck—Ducts and duct fittings. Clayton & Lambert Mfg. Co., Louisville, Ky.
LaMont—High temperature heating systems. The International Boiler Works Co., East Stroudsburg, Pa.
Lawson—Wrenches. Fairmount Tool & Forging, Cleveland, O.
L-Blow—Fans, ventilators. Trade-Wind Motorfans, Inc., Los Angeles, Calif.
Leader—Stocks and dies. Oster Mfg. Co., Cleveland, O.
Leader—Unit air conditioning. Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
Leaflex—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Leak Lock—Cement and compounds. Highside Chemicals Co., Clifton, N. J.
Lectro-Clad—Protectve coatings, Fittings, Pipe. Bart Mfg. Co., Inc., Belleville, N. J.
Lectrodryer—Dehumidifiers. Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.
Led-Plate—Cement and compounds. Armite Laboratories, Los Angeles, Calif.
Ledaloyl—Sleeve bearings. Johnson Bronze Co., New Castle, Pa.
Leigh—Roof ventilators. Air Control Products, Inc., Coopersville, Mich.
Lektro-Kleen—Air cleaners. Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y. & Columbus, O.
Letheray—Sterilizing lamps. Hanovia Chemical & Mfg. Co., Newark, N. J.
Levalarm—Alarm. Reliance Gauge Column Co., Cleveland, O.
Levelimeter—Indicators, alarms, gages, recorders, regulators, switches. Fischer & Porter Co., Hatboro, Pa.
Levelizer—Gas regulators. Mueller Furnace Co., L. J., Milwaukee, Wis.
Levelometer—Gages, recorders. Liquidometer Corp., Long Island City, N. Y.
Lever-Seald—Valves. Homestead Valve Mfg. Co., Coraopolis, Pa.
Level-Temp—Thermostats. White-Rodgers Electric Co., St. Louis, Mo.
Level-Trol—Regulators. Fisher Governor Co., Marshalltown, Ia.
Liberty—Packing. Johns-Manville, New York, N. Y.
Liberty—Ventilators, caps. Penn Ventilating Co., Philadelphia, Pa.
Life Line—Electric motors. Westinghouse Electric Corp., Pittsburgh, Pa.
Light Duty—Pulleys. Gates Rubber Co., The, Denver, Colo.
Lightening Hole—Punches. M-M-A, Inc., Lancaster, Pa.
Lightning—Cleaning compounds. Western Chemical Co., Kansas City, Mo.
Lightweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.
Lima—Stokers. Carnes, Inc., John R., Lima, O.
Limit-Load—Centrifugal fans. Buffalo Forge Co., Buffalo, N. Y.
Limitorque—Valves. Philadelphia Gear Works, Inc., Philadelphia, Pa.
Limpet—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Lincwelder—Welders. Lincoln Electric Co., The, Cleveland, O.
Line—Electric motors, speed reducers. Brown-Brockmeyer Co., Inc., Dayton, O.
Lineflow—Fans. American Blower Corp., Detroit, Mich.
Line-o-flo—Air diffusers, grilles. Barber-Colman Co., Rockford, Ill.
Link-Grip—Pipe wrenches. American Machine Wks., Inc., Racine, Wis.
Lin-X—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Lincolnwelder—Arc welders. Lincoln Electric Co., The, Cleveland, O.
Lipco—Cement lined fittings and pipe. Cement Lined Pipe Co., Lynn, Mass.
Lipman—Unit Air Conditioning. Yates-American Machine Co., Beloit, Wisc.
Liquidepth—Indicators. Petrometer Corp., Long Island City, N. Y.
Liquiflux—Welding compounds. Sight Feed Generator Co., West Alexandria, O.
Liqui-Jector—Dehumidifiers, dehydrants, dehydrators. Selas Corp. of America, Philadelphia, Pa.
Lite-Cast—Combustion chambers. Monogram Products Co., Inc., Philadelphia, Pa.
Lithcote—Coatings. Lithgow Corp., Chicago.
Lithoform—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Little Blacksmith—Punches, shears. Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
Little Giant—Sump pumps. Chicago Pump Co., Chicago, Ill.
Little Giant—Stock and dies. Greenfield Tap & Die Corp., Greenfield, Mass.
Little Giant—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Little Giant—Pipe crimper tools. Pioneer Tool Company, Racine, Wis.
Livermont—Wrenches. Richmont, Inc., San Gabriel, Calif.
Lloyd—Solder and fluxes. Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Lo-Blast—Burners. Mid-Continent Metal Products Co., Chicago, Ill.
Lo-Fin—Surfaces, tubing. Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Lo-Veyor—Conveyor. Ajax Flexible Coupling Co., Westfield, N. Y.
Lockaire—Insulation. Plastergon Wall Board Co., Buffalo, N. Y.
Lockseam—Pipe. Naylor Pipe Co., Chicago.
Lockseam—Tubing. Helical Tube Corporation, East Orange, N. J.
Lodi—Boilers. Super Mold Corp., Lodi, Calif.
Lok-Joint—Insulation. Insulite Co., Minneapolis, Minn.
Lolag—Heaters. American Instrument Co., Silver Spring, Md.
Longlife—Coating. Flexrock Co., Philadelphia, Pa.
Longrip—Pipe extractors. Ridge Tool Co., Elyria, O.
Lookout Heggie-Simplex—Boilers, heaters. Lookout Boiler & Mfg. Co., Chattanooga.
Lord Burnham—Boilers. Burnham Corp., Boiler Div., Irvington, N. Y.
Lo-Set—Stokers. Canton Stoker Corp., Canton, O.
Louvre—Louvers and shutters. Kelvin-White Co., Boston, Mass.
Lowcost—Boilers. Murray Iron Works Co., Burlington, Ia.
Lown—Machines. San Angelo Foundry & Machine Co., San Angelo, Tex.
Loxin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Loxit—Fittings. Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Loxite—Pipe covering adhesives. Firestone Industrial Products Co., Akron, O.
Luminite—Boiler cleaning compounds, steam system treatment. Warren Refining & Chemical Co., The, Cleveland, O.
Lyonore Metal—Sheets. Lyon, Conklin & Co., Inc., Baltimore, Md.

M. E.—Fans. New York Blower Co., Chicago, Ill.
M. E.—Motors. Marathon Electric Mfg. Corp., Wausau, Wis.
M. & E.—Cooling surface, tubing, unit coolers, unit heaters. Merchant & Evans Co., Philadelphia, Pa.
M & F—Rubber base enamel. American-Marietta Co., Chicago, Ill.
M & H—Sheets. Matthiessen & Hegeler Zinc Co., La Salle, Ill.
MIF—Couplings, fittings. Malleable Iron Fittings Co., Branford, Conn.
MKO—Pumps. Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
M & M—Alarms, cut-offs, feeders, humidifiers, indicators, operators, pumps, regulators, switches, valves. McDonnell & Miller, Inc., Chicago, Ill.
M-R-C—Ball bearings. Marlin-Rockwell Corp., Jamestown, N. Y.
M-Scope—Pipe locators, leak detectors. Fisher Research Laboratory, Inc., Palo Alto, Calif.
M & T—Welders. Metal & Thermit Corp., New York, N. Y.
M/W and A/C Airmat—Air filters. American Air Filter Co., Inc., Louisville, Ky.
M-VB—Valves. Scovill Mfg. Co., Waterville Div., Waterville, Conn.
Macheta—Fans, fan blades, ventilators. Aerovent Fan Co., Inc., Piqua, O.
Magic—Cement and compounds. Blue Ridge Talc Co., Inc., Henry, Va.
Magic-Aire—Fans, air conditioning units.

United Electric Service Co., Wichita Falls, Tex.
Magic Carpet—Door controls. Stanley Works, The, New Britain, Conn.
Magic Chef—Unit coolers. American Stove Co., St. Louis, Mo.
Magic Dial—Pre-assembled control systems. Midwest Automatic Control Co., Des Moines, Ia.
Magic Eye Door—Door controls. Stanley Works, The, New Britain, Conn.
Magic-Grip—Sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Magic Wire—Control systems wire. Midwest Automatic Control Co., Des Moines, Ia.
Magnefer—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Magnehelic—Portable analyzers. Dwyer Mfg. Co., F. W., Chicago, Ill.
Magnetrol—Alarms, boiler cut-offs, switches. Schaub Engineering Co., Fred H., Chicago, Ill.
Magnilastic—Pipe joints. Cook Electric Co., Chicago, Ill.
Mainliner—Fan blades. Burden Co., Alan E., Hollywood, Calif.
Make-up Air—Air conditioning units. New York Blower Co., Chicago, Ill.
Manganend—Electrodes. Arcos Corp., Philadelphia, Pa.
Manganweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Manotox—Coatings. X-Pando Corp., Long Island City, N. Y.
Manu-Rod—Pipe cleaning machines. Spartan Tool Co., Chicago, Ill.
Marine Independent—Burners. Sun-Ray Burner Mfg. Corp., Jamaica, N. Y.
Mark Time—Time switches. Rhodes, Inc., M. H., Hartford, Conn.
Marocol—Compounds. O'Brien Industries, Caldwell, N. J.
Marvair—Air conditioning units. Muncie Gear Works, Muncie, Ind.
Marvellaire—Air conditioning units. Meyer Furnace Co., The, Peoria, Ill.
Marvelous—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Marvelwite—Enamels and lacquers. Sonneborn Sons, Inc., L., New York, N. Y.
Masco—Combustion chambers. Munn & Steele, Inc., South Boston, Mass.
Mascote—Insulation. Munn & Steele, Inc., South Boston, Mass.
Massachusetts—Fans, unit heaters, blower wheels, air washers, housings. Bishop & Babcock Mfg. Co., Cleveland, O.
Master—Heating systems, valves. Radiator Valve Co. of America, Philadelphia, Pa.
Master—Fittings. Mel Products Co., The, New Haven, Conn.
Master—Stokers. Muncie Gear Wks., Inc., Muncie, Ind.
Master—Speed changers, controls, thermostats, regulators, switches. White Mfg. Co., St. Paul, Minn.
Master—Unions. Jefferson Union Co., Inc., New York, N. Y.
Master—Water heaters. Kehm Corp., The, Chicago, Ill.
Master-Bilt—Pumps. Schaub Engineering Co., Fred H., Chicago, Ill.
Master Kraft—Oil burners. Harvey-Whipple, Inc., Springfield, Mass.
Maximon—Gages. J. E. Lonergan Co., Philadelphia, Pa.
Maxsteam—Boilers. Martin Co., Inc., J. O., San Francisco, Calif.
McDaniel—Floats, traps. Watson & McDaniel Co., Philadelphia, Pa.
McKay O—Boilers. Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
McKee—Boilers, blowers, heaters, blast gates, systems, burners, feeders, pumps, regulators, tanks, torches, valves. Eclipse Fuel Engineering Co., Rockford, Ill.
McKnight—Registers. Tuttle & Bailey, Inc., New Britain, Conn.
Measurrench—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Meco—Torches, compounds, gages, regulators, valves, welding rod. Modern Engineering Co., St. Louis, Mo.
Medrae—Electric heating conductors. Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Melloblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Mel-Rock—Humidifiers, units, ventilators, washers. Mellish & Murray Co., Chicago, Ill.
Mercury—Pipe cutting machines. Obear & Son, W. F., Los Angeles, Calif.
Merrill Process—Heating systems. Parks-Cramer Co., Fitchburg, Mass.
Metal-Master—Shears. Wiss & Sons Co., J., Newark, N. J.
Metalflo—Tubes and tubing. H & H Tube & Mfg. Co., Detroit, Mich.
Metalhide—Protective coatings. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Metalite—Enamels and lacquers. Atlas Powder Co., North Chicago, Ill.
Metalprep—Compounds. Nielson Chemical Co., Detroit, Mich.
Metaphram—Valves. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Metco—Ducts and duct fittings. Sheet Metal Mfg. Co., Inc., Brooklyn, N. Y.
Metermax—Thermometers. Leeds & Northrup Co., Philadelphia, Pa.
Met-L-Flex—Bases and pads. Robinson Aviation, Inc., Vibrashock Div., Teterboro, N. J.
Metl-Tech—Doors and panels, metal sheets. Technical Ply-Woods, Chicago, Ill.
Metric—Meters. American Meter Co., Inc., New York, N. Y.
Metrotherm—Thermostats. General Controls Co., Glendale, Calif.
Micafil—Insulation. Munn and Steele, Inc., South Boston, Mass.
Mico—Insulation. Mineral Insulation Co., Chicago Ridge, Ill.
Micro—Low water cut-offs. Maid-O'-Mist, Inc., Chicago, Ill.
Micro-Feed—Humidifiers. Cleveland Humidifier Co., Cleveland, O.
Micr-O-Feeder—Proportioning pumps. % Proportioneers, Inc. %, Providence, R. I.
Micro-Klean—Filters. Cuno Engineering Corp., Meriden, Conn.
Micromax—Recorders, indicator and recorder-controllers, thermometers. Leeds & Northrup Co., Philadelphia, Pa.
Micromet—Water treatment. Calgon Inc., Pittsburgh, Pa.
Micromotors—Motors. Redmond Co., Inc., Owosso, Mich.
Micro-Netic—Feeders. Campbell Co., J. A., Long Beach, Calif.
MicroRold—Sheets. Washington Steel Corp., Washington, Pa.
Microtherm—Thermostats. Barber-Colman Co., Rockford, Ill.
Microvac—Pumps. Stokes Machine Co., F. J., Philadelphia, Pa.
Micro-Weld—Spot welders. Micro Products Co., Chicago, Ill.
Midget—Radiation. Utica Radiator Corp., Utica, N. Y.
Midget Powerhouse—Unit heaters. Century Engineering Corp., Cedar Rapids, Ia.
Mighty Mite—Thermostats. Mechanical Industries Production Co., Akron, O.
Milcor—Doors and panels. Inland Steel Products Co., Milwaukee, Wis.
Milford—Tools. Thompson & Son Co., The Henry G., New Haven, Conn.
Mills—Boilers. Smith Co., Inc., H. B., The, Westfield, Mass.
Milvaco—Air eliminators, floats, strainers, traps, valves. Milwaukee Valve Co., Milwaukee, Wis.
Minneapolis—Compressors. North Penn Co., New York, N. Y.
Mipco—Valves. Marine & Industrial Products Co., Philadelphia, Pa.
Miracle Red—Coatings. Debevoise Co., The, Brooklyn, N. Y.
Miracula—Air conditioning units. General Engineering & Mfg. Co., St. Louis, Mo.
Mir-O-Meter—Combustion control systems. Bowser, Inc., Fort Wayne, Ind.
Mixend—Arc welding electrodes. Arcos Corp., Philadelphia, Pa.
MKayO—Boilers. Mears-Kane-Ofeldt Inc., Philadelphia, Pa.
Moderator—Heating System. Warren Webster Co., Camden, N. J.
ModernAire—Fans, unit air conditioners. National Gas Equipment Co., Inc., Terrell, Tex.
Moduflow—Control systems. Minneapolis-Honeywell Regulator Co., Minneapolis.
Modustat—Valves. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modutrol—Heating systems, valve and duct operators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modutron—Regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mogul—Packing. Johns-Manville, New York, N. Y.
Mogul—Boiler cleaning compounds and water treatment. North American Mogul Products Co., The, Cleveland, O.
Moisture Magnet—Dehumidifiers. Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
Monel—Pipe fittings, nipples, flanges, pipe, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Monend—Arc welding electrodes. Arcos Corp., Philadelphia, Pa.
Mongol—Pipe joint cement and compounds. Baer Bros., New York, N. Y.
Monmouth—Filters, humidifiers, valves. Cleveland Humidifier Co., Cleveland, O.
Mono-Block—Insulation. Baldwin-Hill Co., Trenton, N. J.
Monobolt—Chillers, oil coolers, water heaters. Graham Mfg. Co., Inc., New York, N. Y.
Mono-Cast—Pipe. American Cast Iron Pipe Co., Birmingham, Ala.
Monocast—Refractories and refractory cement. Ramtite Co., The, Chicago, Ill.
Monoflo—Hot water heating systems and fittings. Bell & Gossett Co., Morton Grove, Ill.
Mono-Line—Refractories. Quigley Co., Inc., New York, N. Y.
Monoloct—Heat exchangers. Graham Mfg. Co., Inc., New York, N. Y.
Monomotors—Motors. Redmond Co., Inc., Owosso, Mich.
Mono-Peen—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Monovent—Ventilators. Burt Mfg. Co., Akron, O.
Monsoon—Fans, grilles, louvers. Jamieson Mfg. Co., Dallas, Texas.
Morflex—Flexible couplings. Morse Chain Co., Detroit, Mich.
Morlex—Steam system treatment. Carbide & Carbon Chemicals Co., A Div. of Union Carbide and Carbon Corp., New York, N. Y.
Mortairset—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Mortite—Gaskets. Mortell Co., J. W., Kankakee, Ill.
Moto-Merco—Relays. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Motopump—Pumps. Yeomans Bros. Co., Chicago, Ill.
MotoReducer—Speed reducers. Philadelphia Gear Works, Inc., Philadelphia, Pa.
Motorstoker—Stokers. Hershey Machine & Foundry Co., Motorstoker Div., Manheim, Pa.
Motosteel—Valves. Taylor Instrument Companies, Rochester, N. Y.
Mototurb—Ventilators. Uno Ventilator Co., Malden, Mass.
Mouat—Compounds, eliminators, traps. Squires Co., C. E., The, Cleveland, O.
Mountain Air—Air conditioning units. Central States Mfg. Co., Inc., Arkansas City, Kan.
Muckle-Vent—Ventilators. Muckle Mfg. Co., Owatonna, Minn.
Muffletone—Insulation. Celotex Corp., The, Chicago, Ill.
Mullitex—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Mult-Au-Matic—Threading and boring machines. Bullard Co., The, Bridgeport, Conn.
Multiblade—Welding fume exhausters. General Blower Co., Morton Grove, Ill.
Multiclone—Dust collectors. Western Precipitation Corp., Los Angeles, Calif.
Multi-Duty—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Multiduty—Pulleys and sheaves. Gates Rubber Co., The, Denver, Colo.
Multilarm—Alarms. Automatic Control Co., St. Paul, Minn.
Multiplane—Vibration isolating bases. Lord Mfg. Co., Erie, Pa.
Multi-Seal—Bolts, repair plugs. Kenney Co., L. C., Chicago, Ill.
Multitherm—Air conditioning units. Clarage Fan Co., Kalamazoo, Mich.
Multi-V—V-belts. Goodrich Co., B. F., Akron, O.
Multivane—Fans, blowers, unit heaters. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Multi-V-Drive—Drives. Worthington Pump & Machinery Corp., Harrison, N. J.
Multi-Vise—Pipe vises. American Implement Co., Omaha, Neb.
Multi-Wash—Dust collectors. Schneible Co., Claude B., Detroit, Mich.
Murco—Aftercoolers, heat exchangers, unit heaters. Murray Mfg. Co., D. J., Wausau, Wis.
Murex—Welding electrodes. Metal & Thermit Corp., New York, N. Y.

NCG—Solder, torches, welding rod. National Cylinder Gas Co., Chicago, Ill.
N-M-D—Valves. Lunkenheimer Co., Cincinnati, O.
NYB Steelfin—Heating surface. New York Blower Co., Chicago, Ill.
Nalco—Feeders, water treatment, soot destroyers. National Aluminate Corp., Chicago, Ill.
National—Boilers, heaters. National Radiator Co., The, Johnstown, Pa.
National—Fans, furnaces. MaGirl Foundry & Furnace Co., Bloomington, Ill.
National—Heaters. Mid-Continent Metal Products Co., Chicago, Ill.
National—Pipe, tubing. National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
National—Pipe cutters. Wachs Co., E. H., The, Chicago, Ill.
National Art—Convection radiation, heat exchangers. National Radiator Co., The, Johnstown, Pa.
National-Champion—Furnaces, air heaters. National Heater Co., St. Paul, Minn.
Natur Temp—Insulation. Plastergon Wall Board Co., Buffalo, N. Y.
Naturzone—Insulation. Wilson & Co., Inc., Chicago, Ill.
Navalon—Fiber packing. Johns-Manville, New York, N. Y.
Nelson—Stokers. Heating Assurance, Inc., Spokane, Wash.
Nelweld—Welders. Nelson Stud Welding Div., Morton Gregory Corp., Lorain, O.
Nemo—Insulating cement. Smith & Kanzler

Corp., Linden, N. J.
Nesbitt—Heaters. Webster & Co., Warren, Camden, N. J.
New Cyclone—Dust collectors. Kirk & Blum Mfg. Co., Cincinnati, O.
Niagara—Meters. Buffalo Meter Co., Buffalo, N. Y.
Nibco—Fittings, flanges, joints, valves. Northern Indiana Brass Co., Elkhart, Ind.
Nibcoloy—Fittings, pipe, stainless steel. Northern Indiana Brass Co., Elkhart, Ind.
Nickelend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nickend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nicloy—Pipe, tubes, tubing. Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Nicuend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nite Cool—Fans. Air Equipment Co., Chicago, Ill.
No Drip—Insulation, protective coatings. J. W. Mortell Co., Kankakee, Ill.
Non-clog—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.
Non-clog—Pipe line strainers. Boylston Steam Specialty Co., Chicago, Ill.
Non-Clogging—Spray nozzles. Link-Belt Co., Chicago, Ill.
Non-Con-Dux—Cement, insulation. Grant Wilson, Inc., Chicago, Ill.
Non-Frost—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Nonisol—Sludge prevention treatment. Alrose Chemical Co., Providence, R. I.
Non-Sweat—Insulation. Keasbey & Mattison Co., Ambler, Pa.
No-Ox-Id—Protective coatings. Dearborn Chemical Co., Chicago, Ill.
Norblo—Dust collectors, fans. Northern Blower Co., Cleveland, O.
Northwestern—Water heaters. Coe Mfg. Co., Painesville, O.
Northwind—Unit air coolers. Pleasantaire Corp., Washington, D. C.
Norwesco—Cement and compounds, boiler and radiator sealing compounds. Atlas Chemical Co., Marietta, O.
No-Thread—Fittings. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
No-Vent—Pumps. Stout & Sons, David, St. Louis, Mo.
Novoid—Insulation, adhesives. Cork Import Corp., Englewood, N. J.
Nox-Odor—Odor adsorber. Tamms Industries, Inc., Chicago, Ill.
Nu-Air—Fans, window ventilator units. Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Nu-Alpina—Ventilators. Inland Steel Products Co., Milwaukee, Wis.
Nu-Grip—Shears and snips. Wiss and Sons Co., J., Newark, N. J.
Nullmatic—Gages, indicators, meters, recorders. Moore Products Co., The, Philadelphia, Pa.
Nu-Notch—Mushroom ventilators. Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Nuvent—Ventilators. Aeolus Dickinson, Chicago, Ill.
Nu-Wood—Insulation. Wood Conversion Co., St. Paul. Minn.
Nyavco—Valves. New York Air Valve Corp., Brooklyn, N. Y.
Nylined—Sleeve bearings. Thomson Industries, Inc., Manhasset, N. Y.

OB—Valves, Ohio Brass Co., Mansfield, O.
O'B-Aid—Compounds. O'Brien Industries, Caldwell, N. J.
O'B-Aige—Water treatment. O'Brien Industries, Caldwell, N. J.
O'B-Col—Compounds. O'Brien Industries, Caldwell, N. J.
O'B-Ox—Water treatment. O'Brien Industries, Caldwell, N. J.
OCH—Filters. American Air Filter Co., Louisville, Ky.
O.E.M.—Flue caps, combustion chambers, cement and compounds. Oil Equipment Mfg. Corp., New Haven, Conn.
Oakwood—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Oasis—Electric dehumidifiers. Ebco Mfg. Co., Columbus, O.
O'Both—Water treatment. O'Brien Industries, Caldwell, N. J.
O'Burnit—Soot destroyers. O'Brien Industries, Caldwell, N. J.
Octopus—Welding fume exhausters. Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Ofeldt—Boilers. Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Oil-A-Fire—Burners. Automatic Firing Corp., St. Louis, Mo.
Oilbuster—Boiler cleaning compounds. Cannon Chemical Co., Inc., Cambridge, Mass.
Oil-O-Matic—Oil burners. Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
Oiltex—Gaskets. Chicago Gasket Co., Chicago, Ill.
Oilway—Oil fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Okay Tred—Leather belting. Houghton & Co., E. F., Philadelphia, Pa.
Ol' Faithful—Humidifiers. Maid-O'-Mist, Inc., Chicago, Ill.
One Venturi—Heating systems. Taco Heaters, Inc., Providence, R. I.
Oriflex—Valves. Dunham Co., C. A., Chicago, Ill.
Ovaltube—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Oversize—Refrigerant dehydrators. Wabash Mfg. Co., Chicago, Ill.
Oxequip—Oxygen systems. Oxygen Equipment & Service Co., Chicago, Ill.
Oxweld—Welding rod, welding and cutting apparatus. Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Oxyarc—Welding and cutting apparatus. Arcos Corp., Philadelphia, Pa.
Oxycuttend—Electrodes. Arcos Corp., Philadelphia, Pa.
Ozite—Insulation. American Hair & Felt Co., Chicago, Ill.

P. B. H.—Cocks, try cocks. Paul B. Huyette Co., Inc., Philadelphia, Pa.
P-D—Fittings. Gold Top Heating, Inc., Butte, Mont.
P-D—Pumps. Peters-Dalton, Inc., Detroit, Mich.
PD—Blowers, dust collectors, heat exchangers, fans. Prat-Daniel Corp., East Port Chester, Conn.
PD QC—Pipe machines. Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
P & H—Blue print machines. Peck & Harvey, Chicago, Ill.
P & H—Welding electrodes, arc welders. Harnischfeger Corp., Milwaukee, Wis.
P. I. V. Gear—Speed changers. Link-Belt Co., Philadelphia, Pa.
Pacemaker—Coolers. McQuay, Inc., Minneapolis, Minn.
Pacific—Unit Heaters. Palmer Mfg. Corp., Phoenix, Ariz.
Pacific—Furnaces. Rosebraugh Co., W. W., Salem, Ore.
Pacific Coast—Refrigerant dehydrators. Wabash Mfg. Co., Chicago, Ill.
Paintgrip—Sheets. Armco Steel Corp., Middletown, O.
Paladin—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Palco—Packing. Greene, Tweed & Co., North Wales, Pa.
Palco Wool-Saferized—Insulation. Pacific Lumber Co., The, San Francisco, Calif.
Palmaire—Furnaces, unit heaters, humidifiers. Palmer Mfg. Corp., Phoenix, Ariz.
Palmetto—Packing, Greene, Tweed & Co., North Wales, Pa.
Palmetto Superheat—Gaskets. Greene, Tweed & Co., North Wales, Pa.
Panelray—Gas fired suspended heaters. Day & Night Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
Pan-L-Grid—Coils and panels. Pan-L-Heat Corp., Portland, Ore.
Par—Air and refrigerating compressors. Lynch Corp., Toledo, O.
Paracoil—Coils, condensers, heaters, oil coolers, pipe nipples, preheaters, steam traps, water chillers, aftercoolers, heating units, valves. Davis Engineering Corp., Elizabeth, N. J.
Paraline—Motor bases. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Parasol—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Pathfinder—Belting. Goodyear Tire & Rubber Co., Akron, O.
Pedrifugal—Centrifugal pumps. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Peerless—Pipe machines. Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
Peerless—Direct radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Peerless—Industrial stokers. Eddy Stoker Corp., Chicago, Ill.
Pelro—Asbestos packing. Greene, Tweed & Co., North Wales, Pa.
Pen—Ventilators. Southern States Iron Roofing Co., Savannah, Ga.
Penco—Plastic fittings, pipe. North Penn Co., New York, N. Y.
Penflex-Weld—Absorbers. Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Pennco—Sectional cast iron boilers. Pennsylvania Furnace & Iron Co., Warren, Pa.
Penn Dynafan—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Penn-M-Co—Fittings. Penn Mfg. Corp., of Washington, Pa., Washington, Pa.
Penn-Power—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Penn-Turbine—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Pennsalt—Cleaning compounds. Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perfectaire—Heaters. Air Conditioning Engineering Co., Cambridge, Mass.
Perfection—Hangers and supports. Iwan Brothers, Inc., South Bend, Ind.
Perfection—Plates. Beaton & Cadwell Mfg. Co., New Britain, Conn.
Perfection—Valves. American District Steam Co., North Tonawanda, N. Y.
Perfecto—Boiler parts, cement. Green Fire Brick Co., Mexico, Mo.
Permadine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Permanite—Plastic Pipe. Knight, Maurice A., Akron, O.
Permaseal—Gaskets. Chicago Gasket Co., Chicago, Ill.
PeroNite—Soot destroyers. Perolin Co., Inc., Chicago, Ill.
Petco—Insulating cement, chambers. Peterson Co., B. A., Dowagiac, Mich.
Petro—Oil burners, water heaters. Petroleum Heat & Power Co., Stamford, Conn.
Pexto—Brakes, punches, shears, wrenches, machines. Peck, Stow & Wilcox Co., Southington, Conn.
Pic—Malleable unions. Dart Union Co., E. M., Providence, R. I.
Pic—Steel unions. Fairbanks Co., New York, N. Y.
Pier—Spot welders. Peer, Inc., Benton Harbor, Mich.
Pilotstat—Flame failure controls. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Pioneer—Thermostats. Crown Controls Co., Inc., New Bremen, O.
Pipe Master—Pipe wrenches. Erie Tool Wks., Erie, Pa.
Pipeasy—Pipe Cement. Flexrock Co., Philadelphia, Pa.
Pipe Master—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Pipemaster—Wrenches. Erie Tool Wks., Erie, Pa.
Pipetite—Cements and compounds. Lake Chemical Co., Chicago, Ill.
Pittairaide—Air sterilizing units. Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Pittsburgh—Unit heaters. Automatic Gas Equipment Co., Pittsburgh, Pa.
Pittsburgh-National—Meters. Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
Planeweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.
Plasgon—Cement and compounds. Samuel Cabot, Inc., Boston, Mass.
Plastic Gasket—Pipe cement. Flexrock Co., Philadelphia, Pa.
Plasticote—Electric wire. Chester Cable Corp., Chester, N. Y.
Plastoid—Furnace cement. Plastic Products Co., Detroit, Mich.
Platecoil—Coils. Kold-Hold Manufacturing Co., Lansing, Mich.
Playford—Stokers. Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Plexifin—Unit heaters. Bayley Blower Co., Milwaukee, Wis.
Plexiform—Fans. Bayley Blower Co., Milwaukee, Wis.
Plexiform Junior—Unit ventilators. Bayley Blower Co., Milwaukee, Wis.
Plicast—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Pliojet—Jets for smoke abatement. Plibrico Jointless Firebrick Co., Chicago, Ill.
Plisulate—Insulating cement and insulation. Plibrico Jointless Firebrick Co., Chicago.
Plumber Krak-Stik—Cement and compounds. Lake Chemical Co., Chicago, Ill.
Plumrite—Pipe. Bridgeport Brass Co., Bridgeport, Conn.
Plymouth—Stokers. Clizbe Bros. Mfg. Co., Plymouth, Ind.
Plymouth—Stokers. Plymouth Industries, Inc., Plymouth, Ind.
Ply-Tech—Plywood sheets and board. Technical Ply-Woods, Chicago, Ill.
Pneumastat—Aftercoolers. Schramm, Inc., West Chester, Pa.
Pneumatractor—Aftercoolers. Schramm, Inc., West Chester, Pa.
Pneumatronic—Electronic and pneumatic temperature control equipment. Johnson Service Co., Milwaukee, Wis.
Poeco—Insulation. Poe Co., C. W., Cleveland, O.
Polartron—Relays, regulators, switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Polymerin—Protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.
Polymeroid—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Polytherm—Protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.
Pony—Pipe clamps. Adjustable Clamp Co., Chicago, Ill.
Poronze—Filters. Wabash Mfg. Co., Chicago.
Poro-Stone—Filters. Adams Co., Inc., R. P., Buffalo, N. Y.
Port-A-Pony—Pipe cutting machines. Thread-Ezy Mfg. Co., Corunna, Mich.
Porta Drive—Pipe cutting machines. Muncie Gear Wks., Inc., Muncie, Ind.

Porto-Power—Pipe benders and pipe pushers, pumps, punches. Blackhawk Mfg. Co., Milwaukee, Wis.
Porto Shears—Shears. Black & Decker Mfg. Co., Towson, Md.
Porto-Spot—Welders. Marquette Mfg. Co., Minneapolis, Minn.
Portovent—Hose. American Ventilating Hose Co., New York, N. Y.
Positive Arc—Arc welders. Welding Apparatus Co., Chicago, Ill.
POWair Saver—Propeller fans. Pritchard & Co., J. F., Equipment Div., Kansas City.
Poweraire—Furnaces. Jackson & Church Co., Saginaw, Mich.
Powerated—Furnaces. Jackson & Church Co., Saginaw, Mich.
Power—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Powercord—Flat belt drives. Gates Rubber Co., The, Denver, Colo.
Power Gems—Boilers. Edge Moor Iron Works, Inc., Edge Moor, Del.
Power-Flame—Leak detectors. Justrite Mfg. Co., Chicago, Ill.
Powermaster—Boilers. Orr & Sembower, Inc., Reading, Pa.
Poweroil—Oil burners. Jackson & Church Co., Saginaw, Mich.
Power-Poise—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.
Prasco—Insulation. Pabco Products Inc., San Francisco, Calif.
Pratt & Cady—Valves. R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Precipitron—Air cleaners. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass
Precision—Nozzles. Benjamin Air Rifle Co., St. Louis, Mo.
Precision Molded—Insulation. Pabco Products Inc., San Francisco, Calif.
Premier—Welding rod. American Steel & Wire Co., United States Steel Corp. Subsidiary, Cleveland, O.
Pre-Notch—Ducts and duct fittings. Gray Metal Products, Inc., Rochester, N. Y.
Prepo—Brazing and soldering torches. Pressure Products Corp., Chicago, Ill.
Pressuregraph—Indicator-controllers, gages, recorders. Electro Products Laboratories, Inc., Chicago, Ill.
Pressure-Link—Gages. J. E. Lonergan Co., Philadephia, Pa.
Pressuretrol—Regulators, switches. Minneapolis-Honeywell Regulator Co., Minneapolis.
Prestal—Pipe and tube benders. Tal Bender, Inc., Milwaukee, Wis.
Prestico—Furnace cement. Presstite Engineering Co., St. Louis, Mo.
Prest-O-Lite—Leak detectors, torches. Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Presto-Lock—Couplings. Drinkwater, Inc., Waukegan, Ill.
Prest-O-Weld—Welding and cutting apparatus. Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York.
Princo—Gages, manometers, psychrometers, regulators, relays, thermometers, thermostats. Precision Thermometer and Instrument Co., Philadelphia, Pa.
Propeloflo—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Prop-R-Temp.—Air conditioning units. Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Protectoglo—Controls, systems. Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Protectomotor—Air filters, separators. Dollinger Corp., Rochester, N. Y.
Protector—Lamps. M-M-A, Inc., Lancaster, Pa.
Protect-O-Ray—Lamps. Lustra Corp. of America, Brooklyn, N. Y.
Protectorelay—Flame failure controls, relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Proxlin—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Pryzoak—Belting. Graton & Knight Co., Worcester, Mass.
Pul-Air—Ventilators. Lyon, Conklin & Co., Inc., Baltimore, Md.
Pul Air—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Pulsorb—Gages. Lonergan Co., J. E., Philadelphia, Pa.
Pulling—Circulators, pumps. Columbus Steam Pump Works Co., Columbus, O.
Pulverzone—Stokers. American Coal Burner Co., Chicago, Ill.
Punkah—Louvers and shutters. White & Sons, Inc., Wilfred O., Boston, Mass.
Puridryer—Dehumidifiers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Pur-O-Fiers—Separators. Goodyer Industries, Inc., Chicago, Ill.
Pur-O-Cel—Water filters. % Proportioneers, Inc. %, Providence, R. I.
Purox—Welding and cutting apparatus. Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., New York, N. Y.
Pylets—Switches. Pyle-National Co., The, Chicago, Ill.
Pyratherm—Controls. Mercoid Corp., The, Chicago, Ill.
Pyrex—Glass pipe, heat exchangers, gage and sight glasses. Corning Glass Wks., Corning, N. Y.
Pyro—Thermometers, recorders, regulators. Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Pyrofax—Propane gas refrigerant. Carbide and Carbon Chemicals Corp., New York, N. Y.
Pyroflex—Coatings, lined pipes, tanks, enamels and lacquers. Knight, Maurice A., Akron, O.
Pyromaster—Regulators. Bristol Co., The, Waterbury, Conn.
Pyrotrol—Flame failure controls. Bristol Co., The, Waterbury, Conn.
Pyrotron—Recorders. Bailey Meter Co., Cleveland, O.
Pyrovisor—Controls. Bristol Co., The, Waterbury, Conn.

QD—Pulleys and sheaves. Worthington Pump & Machinery Corp., Harrison, N. J.
Q-T—Insulation. Celotex Corp., The, Chicago, Ill.
Q-Chromastic—Refractories. Quigley Co., Inc., New York, N. Y.
Q-Chrome—Refractories. Quigley Co., Inc.. New York, N. Y.
Q-Scal-Damit—Boiler sealing compounds. Quigley Co., Inc., New York, N. Y.
Quad—Fans. Trade-Wind Motorfans, Inc. Los Angeles, Calif.
Quantrol—Vanes. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Quartzoid—Sprinkler heads. Grinnell Co., Inc., Providence, R. I.
Quick-as-Wink—Valves. C. B. Hunt & Son, Inc., Salem, O.
Quick-Clip—Insulation fasteners. Nelson Stud Welding Div., Morton Gregory Corp., Lorain, O.
Quick-Label—Identification markers. Brady Co., W. H., Chippewa Falls, Wis.
Quik-Mask—Gaskets. Brady Co., W. H., Chippewa Falls, Wis.
Quik-Temp—Steam traps. Schaub Engineering Co., Fred H., Chicago, Ill.
Quintair—Heat exchangers. Pritchard & Co., J. F., Kansas City, Mo.
Quintex—Heat exchangers. Pritchard & Co., J. F., Kansas City, Mo.
Quintube—Heat exchangers. Pritchard & Co., J. F., Kansas City, Mo.

RBC—Roller bearings. Roller Bearing Co. of America, Trenton, N. J.
RB Pressure—Pressure blowers. Western Blower Co., Seattle, Wash.
RC—Couplings. Link-Belt Co., Indianapolis, Ind.
R. D.—Valves. Grinnell Co., Inc., Providence, R. I.
R & G—Grilles, registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
RH—Air conditioning units. McQuay, Inc., Minneapolis, Minn.
R. I.—Unions. Rhode Island Fittings Co., Providence, R. I.
R-K—Combustion control systems, regulators, valves. Ruggles-Klingemann Mfg. Co., Boston, Mass.
R & M—Motors. Robbins & Myers, Inc., Springfield, O.
R-M—Packing. Raybestos-Manhattan, Inc., Passaic, N. J.
R. M. B.—Ball bearings. Landis & Gyr, Inc., New York, N. Y
R & M Moyno—Pumps. Robbins & Myers, Inc, Springfield, O.
R-Mir-Dek—Protective coatings. Miracle Adhesives Corp., New York, N. Y.
RP—Air filters, water softeners. Research Products Corp., Madison, Wis.
R P M—Sheet metal. Robertson Co., H. H., Pittsburgh, Pa.
RTC—Valves. Gold Top Heating, Inc., Butte, Mont.
R-U-F—Fans. Reed Unit-Fans, Inc., New Orleans, La.
R-Z-U Junior—Fire tube boilers. Fitzgibbons Boiler Co., Inc., New York, N. Y.
Radiafin—Finned tubing, finned surface. Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Radioflow—Valves. Smolensky Valve Co., Inc., Bedford, O.
Radiant—Direct radiation. Burnham Corp., Boiler Div., Irvington, N. Y.
Radiantrol—Valves. Homestead Valve Mfg. Co., Coraopolis, Pa.
Radi-Aire—Propeller fans. Reynolds Electric Co., River Grove, Ill.
Radi-Ion—Ionization apparatus. Montgomery Bros., San Francisco, Calif.
Radi-Vector—Radiation. Vulcan Radiator Co., Hartford, Conn.
Radolite—Cement, refractories. Pyrolite Products Co., Cleveland, O.
Rador—Thermostats. Vapor Heating Corp., Chicago, Ill.
Raintite—Ventilators. Aeolus Dickinson, Chicago, Ill.
Rajah—Packing. Johns-Manville, New York, N. Y.
Ramapo—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Ramset—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Ranarex—Analyzers, indicators, recorders. Permutit Co., New York, N. Y.
Rapid—Oil coolers. Bell & Gossett Co., Morton Grove, Ill.
Rapiduction—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Ratochlor—Steam and water treatments. Fischer & Porter Co., Hatboro, Pa.
Ratogage—Indicator-controllers, recorder-controllers, recorders. Fischer & Porter Co., Hatboro, Pa.
Ratosight—Alarms, flow switches. Fischer & Porter Co., Hatboro, Pa.
Ratotherm—Gages, indicator-controllers, recorder-controllers, recorders, and thermometers. Fischer & Porter Co., Hatboro, Pa.
Rawl-Anchor—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Rawldrill—Drills for masonry. Rawlplug Co., Inc., The, New York, N. Y.
Rawl-Drive—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Rawl Taper—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Raychronix—Leak detectors. Radioactive Products, Inc., Detroit, Mich.
Raydiant—Radiation. Weil-McLain Co., Michigan City, Ind.
Rayduct—Pipe. Bethlehem Steel Co., Bethlehem, Pa.
Raymaster—Refrigerant leak detectors. George W. Gates & Co., Inc., Franklin Sq., L. I., N. Y.
Reading—Fittings, valves. R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Ready-Pack—Clamps. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Recirculair—Unit heaters. New York Blower Co., Chicago, Ill.
Reco—Accumulators, condensers, headers, heaters, preheaters, tanks, unit coolers. Richmond Engineering Co., Richmond, Va.
Reco—Controllers and starters, motors, propeller fans, switches. Reynolds Electric Co., River Grove, Ill.
Recold—Refrigerating evaporative condensers, coolers, cooling & heating surface, cooling towers, air conditioning units. Refrigeration Engineering, Inc., Los Angeles, Calif.
Reco—Radi-Aire—Fans. Reynolds Electric Co., Chicago, Ill.
Record-O-Stat—Recorder-controllers. Johnson Service Co., Milwaukee, Wis.
Recoy—Chillers, condensers, cooling surface, unit air conditioners and coolers. Refrigeration Economics Co., Inc., Canton, O.
Red—Compressors, controllers and starters, heaters, indicators. operators, regulators, switches, thermostats. Cooper Co., Clark, Palmyra, N. J.
Red Cap—Ventilators, Warner Ventilator Co., La Grange, Ind.
Red Devil—Furnace and pipe joint cement. Pecora Paint Co., Philadelphia, Pa.
Red Diamond—Pipe. American District Steam Co., North Tonawanda, N. Y.
Red-E-Haul—Portable machines. American Die & Tool Co., Inc., Reading, Pa.
Red Flash—Traps. Ellis Drier Co., Chicago, Ill.
Red Head—Tongs. Billings & Spencer Co., Hartford, Conn.
Red Head—Traps. Ellis Drier Co., Chicago, Ill.
Redi-Bends—Coils. Capitol Mfg. & Supply Co., Columbus, O.
Redi—Stokers. General Machinery Co., Spokane, Wash.
Redi-Return—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Red Seal—Gaskets. Chicago Gasket Co., Chicago, Ill.
Redi-Vac—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Red Reading Mercury—Hygrometers, psychrometers, thermometers. Palmer Thermometers, Inc., Cincinnati, O.
Red Seal—Engines. Continental Motors Corp., Muskegon, Mich.
Red Socket—Wrenches. Lowell Wrench Co., Worcester, Mass.
Red Top—Humidistats, thermostats. H-B Instrument Co., Philadelphia, Pa.
Red Top—Insulation. United States Gypsum Co., Chicago, Ill.
Redycote—Coatings. Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
Reformend—Electrodes. Arcos Corp., Philadelphia, Pa.
Refrak Screen—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Rego—Regulators, valves, welding and cutting apparatus. National Cylinder Gas Co., Chicago, Ill.
Reiser—Valves. Homestead Valve Mfg. Co. Coraopolis, Pa.

Relatrol—Heating systems. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Reliance—Regulators. American Meter Co., Inc., New York, N. Y.
Remote—Indicators. Yarnall - Waring Co., Philadelphia, Pa.
Renewo—Valves. Lunkenheimer Co., Cincinnati, O.
Renovair—Air freshening compounds. Boyle-Midway Inc., New York, N. Y.
Renu-Glas—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Research—Belting. Graton & Knight Co., Worcester, Mass.
Resiscote—Enamels and lacquers. Reilly Tar & Chemical Corp., Indianapolis, Ind.
Reliance—Leather belting. Chicago Belting Co., Chicago, Ill.
Resistive—Insulation. Infra Insulation, Inc., New York, N. Y.
Revolute—Blueprint machines. Paragon-Revolute Corp., Rochester, N. Y.
Revolving—Heaters. Wing Mfg. Co., L. J., New York, N. Y.
Revolving—Ventilators. Burt Mfg. Co., Akron, O.
Rex—Chain drives, coal and ash conveyors, couplings, nozzles, bearings, pumps. Chain Belt Co., Milwaukee, Wis.
Rex—Fans, ventilators, wheels. Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Rexarc—Electrodes. Sight Feed Generator Co., West Alexandria, O.
Rex-Flex—Ducts, hose. Chicago Metal Hose Corp., Maywood, Ill.
Rexoil—Burners, heaters. Reif-Rexoil, Inc., Buffalo, N. Y.
Rex-Tube—Duct connections, duct fittings, hose. Chicago Metal Hose Corp., Maywood, Ill.
Rexvane—Fans. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Rex-Weld—Hose, ducts, duct connections. Chicago Metal Hose Corp., Maywood, Ill.
Rhinamel—Enamels and lacquers. Tropical Paint & Oil Co., Cleveland, O.
Ridgevent—Roof ventilators. Octagon Ventilator Co., Chicago, Ill.
Ridgid—Pipe machines, wrenches, cutters, reamers, vises. Ridge Tool Co., Elyria, O.
Rid-Sludge—Cleaning compounds, corrosion treatment. Apex All Weather Products, Chicago, Ill.
Rifco—Unions. Rhode Island Fittings Co., Hillsgrove, R. I.
Riflex—Vibration absorbers. United Metal Hose Co., Inc., Long Island City, N. Y.
Rihco—Humidifiers. Rhode Island Humidifier & Ventilating Co., Boston, Mass.
Rincontrol—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Rip-pl—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Ripple-Fin—Cooling and heating surface. McQuay, Inc., Minneapolis, Minn.
Risselt—Air valves, air eliminators. Moreheat Distribution, Inc., Cincinnati, O.
Robinson—Brakes, punches. New Albany Machine Mfg. Co., New Albany, Ind.
Robot—Switches, thermostats. Miller-Harris Instrument Co., Milwaukee, Wis.
Robot-Eye—Regulators, smoke alarms. General Power Plant Corp., New York, N. Y.
Rockwell—Bast gates. Thermix Corp., The, Greenwich, Conn.
Rocop—Heaters. Rome-Turney Radiator Co., Rome, N. Y.
Rodpax—Packing. National Engineering Products, Inc., Washington, D. C.
Ro-Flo—Compressors. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Rolagrip—Couplings. Gustin-Bacon Mfg. Co., Kansas City, Mo.
Rol-Air—Tools. Imperial Brass Mfg. Co., Chicago, Ill.
Roll-a-Bend—Pipe benders. Radiant Devices, St. Louis, Mo.
Rollway—Pumps. Pioneer Pump & Mfg. Co., Detroit, Mich.
Roofvane—Ventilators. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Ross—Pipe joints. Webster & Co., Warren, Camden, N. J.
Rosslyn Metal—Sheets. American Cladmetals Co., Carnegie, Pa.
Rotameter—Flow meters. Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Rotary—Ventilators. Swartwout Co., Cleveland, O.
Roto Blast—Furnaces. Moncrief Furnace Co., Atlanta, Ga.
Roto-Clone—Dust collectors. American Air Filter Co., Inc., Louisville, Ky.
Rotojet—Spray nozzles. Binks Mfg. Co., Chicago, Ill.
Roto-louvre—Dryers. Link-Belt Co., Chicago, Ill.
Rotomet—Solder and fluxes. Rotometals, Inc., San Francisco, Calif.
Rotometric—Solder and fluxes. Rotometals, Inc., San Francisco, Calif.
Roto-Torq—Tools. Richmont, Inc., San Gabriel, Calif.
Roto-trol—Liquid pressure regulators, indicators, and switches. Healy Ruff Co., St. Paul, Minn.
Rotre—Vacuum pumps. Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Ro-Twin—Air compressors. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Royal—Packing. United States Rubber Co., New York, N. Y.
Roxaprene—Protective coatings, enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Roxco—Wrenches. Trimont Mfg. Co., Roxbury, Mass.
Roxite—Pipe. United States Stoneware Co., New York, N. Y.
Roxyn C—Enamels and lacquers, protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.
Royal—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Royal Clipper—Cutters and shears. M-M-A, Inc., Lancaster, Pa.
Rubalt—Enamels and lacquers, protective coating. Hague & Co., Alfred, Brookyn, N. Y.
Rubatex—Insulation. Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Rubyfluid—Solder. Ruby Chemical Co., Columbus, O.
Rusco—Insulation. Russell Co., F. C., The, Cleveland, O.
Rust Bloc No. 20—Coatings. Turco Products, Inc., Los Angeles, Calif.
Rustbuster—Cleaning compounds. Cannon Chemical Co., Inc., Cambridge, Mass.
Rust Evade—Coatings. Turco Products, Inc., Los Angeles, Calif.
Rust Raider—Compounds. Radiator Specialty Co., Charlotte, N. C.
Rust Veto—Protective Coatings. E. F. Houghton & Co., Philadelphia, Pa.

S-A—Conveyors, feeders. Stephens-Adamson Mfg. Co., Aurora, Ill.
SA—Valves. Lunkenheimer Co., Cincinnati, O.
S. C.—Air heaters, gas burners, recorders. Surface Combustion Corp., Toledo, O.
S.F.E.—Insulation. Standard Fuel Engineering Co., Detroit, Mich.
S-N—Air conditioning units, burners, fans, heaters, pumps, stokers. Scott-Newcomb, Inc., St. Louis, Mo.
S & P—Burners, governors, preheaters, regulators, strainers, fuel oil units, valves. Staples & Pfeiffer, San Francisco, Calif.
S. R. P.—Protective coatings. Sonneborn Sons, Inc., L., New York, N. Y.
Saband—Fuel oil treatment. American Sand Banum Co., Inc., New York, N. Y.
Saco—Speed reducers. Stephens - Adamson Mfg. Co., Aurora, Ill.
Saf - Dry—Refrigerants. Liquid Carbonic Corp., The, Chicago, Ill.
Safe-Flo—Heaters. Duffy Engrg. Co., Portland, Ore.
Safe-T-Aire—Air sterilizing units. Hanovia Chemical & Mfg. Co., Newark, N. J.
Safe Guard—Fuel oil preheaters. Alstrom Corp., Bronx, N. Y.
Safety—Heaters. Wing Mfg. Co., L. J., New York, N. Y.
Saftrol—Controls. Penn Controls, Inc., Goshen, Ind.
Sahara—Dehumidifiers. Niagara Industrial Corp., New York, N. Y.
Saint Louis—Stokers. Ormsby-Osterman, Inc., St. Louis, Mo.
Sairset—Cement. Green Fire Brick Co., Mexico, Mo.
Sal-Mo—Cement, insulation, packing. Sall Mountain Co., Hamilton, O.
Sanidaire—Humidifiers. United States Air Conditioning Corp., Minneapolis, Minn.
Santobrite—Water treatment. Monsanto Chemical Co., St. Louis, Mo.
Santocel—Insulation. Monsanto Chemical Co., Merimac Div., Boston, Mass.
Santosite—Water treatment. Monsanto Chemical Co., St. Louis, Mo.
Santrol—Registers. Tuttle & Bailey, Inc., New Britain, Conn.
Saran—Plastic pipe and tubing. Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
Sarancote—Protective coatings. Saran Lined Pipe Co., Ferndale, Mich.
Satincote—Insulation, building. Insulite Div., Minnesota and Ontario Paper Co., Minneapolis, Minn.
Saunders—Pipe cutters. Erie Tool Works, Erie, Pa.
Saunders—Diaphragm valves. Grinnell Co., Inc., Providence, R. I.
Scaico—Thermostats. Smith Control & Instrument Corp., Palmyra, N. J.
Scentinel—Compounds. Ampion Corp., Long Island City, N. Y.
Schmidt—Torches. Minn-Kota Foundry & Mfg. Co., Fargo, N. D.
Schramminc—Aftercoolers. Schramm, Inc., West Chester, Pa.
Schwan—Propeller pumps. Haertel Co., Walter, Minneapolis, Minn.
Schwan—Gas burners. Jamieson Mfg. Co., Dallas, Texas.
Scoggins—Shears and snips. Pacific Machine & Iron Wks., Tacoma, Wash.
Scotch—Adhesive tape. Minnesota Mining & Mfg. Co., St. Paul, Minn.
Scottie Jr.—Boilers. Kewanee Boiler Co., Kewanee, Ill.
Scroll-Aire—Air heaters. Newcomb-Detroit Co., Detroit, Mich.
Scruin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Scru-peller—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.
Scru-Tite—Expansion Bolts. Master Craft Products, Jamaica, N. Y.
Sea Lion—Leather belting. Chicago Belting Co., Chicago, Ill.
Sea Rings—Asbestos packing. Johns-Manville, New York, N. Y.
Sealeak—Compounds. Ampion Corp., Long Island City, N. Y.
Seal Master—Bearings. Stephens-Adamson Mfg. Co., Aurora, Ill.
Seal-Rite—Cement and compounds. Macksons Co., New York, N. Y.
Seasonmaker—Air conditioning units. McQuay, Inc., Minneapolis, Minn.
Seismo-Dampers—Bases. Korfund Co., Inc., Long Island City, N. Y.
Selectair—Air conditioning units. Johnson Co., S. T., Philadelphia, Pa.
Selectric—Electric heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Selectrol—Regulators. Automatic Control Co., St. Paul, Minn.
Sells—Bearings. Royersford Foundry & Machine Co., Royersford, Pa.
Sensatherm—Thermostats. Mercoid Corp., Chicago, Ill.
Sensitrol—Relays. Weston Electrical Instrument Corp., Newark, N. J.
Sentinel—Pumps. Red Jacket Mfg. Co., Davenport, Ia.
Sentry—Alarms, and smoke recorders. Edwards, L. V., Rockville Center, N. Y.
Sentry—Draft controls, draft regulators. Krueger Sentry Gauge Co., Green Bay, Wis.
Sentry—Heaters. Payne Furnace Div., Affiliated Gas Equipment Inc., Monrovia, Calif.
Sep-return—Separators. Wabash Mfg. Co., Chicago, Ill.
Sequestrene—Water softeners. Alrose Chemical Co., Providence, R. I.
Serval—Gaskets. Chicago Gasket Co., Chicago, Ill.
Service—Packing. Johns-Manville, New York, N. Y.
Servicecoat—Enamels and lacquers. Debevoise Co., The, Brooklyn, N. Y.
Sesure—Gages. Yarnall-Waring Co., Philadelphia, Pa.
"77"—Pipe coverings. Eagle-Picher Co., Cincinnati, O.
Shafconaire—Unit heaters. OverHead Heaters, Inc., Detroit, Mich.
Shawco—Bends, headers. Shaw Co., Benjamin F., Wilmington, Del.
Shelby—Tubing. National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.
Shield-Arc—Electrodes, arc welders. Lincoln Electric Co., Cleveland, O.
Shockmounts—Bases and pads. Lord Mfg. Co., Erie, Pa.
Shone—Sewage ejectors. Yeomans Bros. Co., Chicago, Ill.
Shuntflo—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Shur-Seal—Cement. Chicago Specialty Mfg. Co., Chicago, Ill.
Shutlbrak—Switches. Adam Electric Co., Frank, St. Louis, Mo.
Shut-O-Vent—Louvers and shutters. Reed Unit-Fans, Inc., New Orleans, La.
Signico—Pilot and signal lights. Signal Injector Co., New York, N. Y.
Silastic—Packing. Dow Corning Corp., Midland, Mich.
Silastic—Industrial adhesive tape. Irvington Varnish & Insulator Co., Irvington, N. J.
Silent-Auburn—Burners, heaters, air conditioning units. Auburn Burner Co., Auburn, Ind.
Silent Automatic—Dampers, louvers and shutters. Airecon Industries, Detroit, Mich.
Silentblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Silent-Breeze—Propeller fans. Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Silent Korth—Burners. Eckhart Mfg. Co., Inc., Union, N. J.
Silentvane—Fans. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Sil-Fos—Solder. Handy & Harman, New York, N. Y.
Silicone—Protective coatings. Dow Corning Corp., Midland, Mich.
Silimite—Water treatment. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Sillimanite—Refractories and refractory cement. Taylor Sons Co., Charles, Cincinnati, O.

Siltube—Solder. All-State Welding Alloys Co., Inc., White Plains, N. Y.
Silver Comet—Coatings. Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
Silver Steel—Cutters. E. C. Atkins & Co., Indianapolis, Ind.
Silverstreak—Chain drive. Link-Belt Co., Indianapolis, Ind.
Silver Stream—Spray nozzles. Skinner Irrigation Co., Troy, O.
Silvertop—Eliminators, traps. Anderson Co., V. D., The, Cleveland, O.
Simplex—Gages. Viking Pump Co., Cedar Falls, Ia.
Simplex—Regulators. Bell & Gossett Co., Morton Grove, Ill.
Simplex—Wrenches. Lowell Wrench Co., Worcester, Mass.
Sim-Trol—Controls. Simplex Mfg. Co., Fond du Lac, Wis.
Sioux—Electric drills. Albertson & Co., Inc., Sioux City, Ia.
Sirocco—Blowers, fans. American Blower Corp., Detroit, Mich.
Skelly—Stokers. Combustion Engineering-Super-Heater, Inc., New York, N. Y.
Skil—Drills, shears. Skilsaw, Inc., Chicago, Ill.
Skilbeck—Humidifiers. Techtmann Industries, Inc., Milwaukee, Wis.
Skip-Tooth—Dies. Nye Tool Co., Chicago, Ill.
Sky-Blast—Roof fan ventilators. Propellair Div., Robbins & Myers Inc., Springfield, O.
Slo-Speed—Reducers. Sterling Electric Motors, Inc., Los Angeles, Calif.
Sludgout—Fuel oil treatment. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Slugin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Smith-Dolan—Electric preheaters and stress relievers. Electric Arc, Inc., Newark, N. J.
Smith-Mills—Boilers. Smith Co., Inc., H. B., Westfield, Mass.
Smoothcote—Insulation, building. Insulite Div., Minnesota & Ontario Paper Co., Minneapolis, Minn.
Snapin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Snap-Rite—Ducts and duct fittings. Gray Metal Products, Inc., Rochester, N. Y.
Sno-Breze—Air conditioning units. Palmer Mfg. Corp., Phoenix, Ariz.
Snug—Radiation. Weil-McLain Co., Michigan City, Ind.
Softweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Solair—Air conditioning units. Northwest Heating, Inc., Portland, Ore.
Solray—Radiation. Weil-McLain Co., Michigan City, Ind.
Sol-vet—Cleaning compounds, water treatment. Anderson-Stolz Corp., Kansas City, Mo.
Sonoairduct—Ducts. Sonoco Products Co., Hartsville, S.C.
Sono-O-Seal—Insulation. General Insulating Products Co., Brooklyn, N. Y.
So-Salts—Solder. Turco Products, Inc., Los Angeles, Calif.
Soundliner—Insulation. Baldwin-Hill Co., Trenton, N. J.
Sound-Zorbers—Vibration absorbers. Finn & Co., Inc., T. R., New York, N. Y.
South Wind—Heaters. Stewart-Warner Corp., Heating Div., Indianapolis, Ind.
Sovabead—Dehumidifiers. Socony-Vacuum Oil Co., Inc., New York, N. Y.
Sovereign—Packing. Darcoid Co., Inc., New York, N. Y.
Space Saver—Heaters. Payne Furnace Div., Affiliated Gas Equipment Inc., Monrovia, Calif.
Spartan—Packing, belting. Graton & Knight Co., Worcester, Mass.
Spearhead—Gasket cutters. Zimmerman Packing Co., Cincinnati, O.
Special X—Solder. Industrial Service Laboratories, Milwaukee, Wis.
Speed Clamps—Hose clamps. Tinnerman Products, Inc., Cleveland, O.
Speed Clips—Insulation fasteners. Tinnerman Products, Inc., Cleveland, O.
Speed-Cord—Belt drives. Gates Rubber Co., The, Denver, Colo.
Spee-Dee—Blue print and white print machines. Peck & Harvey, Chicago, Ill.
Speed-Flex—Flat belt drives. Gates Rubber Co., The, Denver, Colo.
Speed Heater—Unit heaters. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Speed Nuts—Locknuts. Tinnerman Products, Inc., Cleveland, O.
Speedomax—Indicator and recorder-controllers, recorders, thermometers. Leeds & Northrup Co., Philadelphia, Pa.
Speed Prime—Pumps. Chain Belt Co., Milwaukee, Wis.
Speed-Trol—Changers. Sterling Electric Motors, Inc., Los Angeles, Calif.
Speedweld—Electrodes. Trindl Products, Ltd., Chicago, Ill.
Speedy—Clamps, cutters, extractors, packing, tools. Chicago Specialty Mfg. Co., Chicago, Ill.
Speedylectric—Generators, heaters. Livingstone Engineering Co., Worcester, Mass.
Speedyvent—Air eliminators. Livingstone Engineering Co., Worcester, Mass.
Spekaluminite—Coatings. Special Chemicals Corp., New York, N. Y.
Sphero—Blow-off valves. Fairbanks Co., New York, N. Y.
Spinner—Gravity ventilators. Warner Ventilator Co., LaGrange, Ind.
Spinner—Ventilators. Inland Steel Products Co., Milwaukee, Wis.
Spiralock—Pulleys and sheaves. Scientiae Tool Co., Dayton, Ohio.
Spiratube—Ducts and duct fittings. Flexible Tubing Corp., Guilford, Conn.
Spiraweld—Pipes. Naylor Pipe Co., Chicago, Ill.
Spiro—Heaters. Stout & Sons, David, St. Louis, Mo.
Spirodome—Spray nozzles. Fluor Corp., Ltd., The, Los Angeles, Calif.
Spirovane—Fans. Western Blower Co., Seattle, Wash.
Spongex—Bases and pads, gaskets, insulation. Sponge Rubber Products Co., Shelton, Conn.
Spot-Aire—Air conditioning units. Drayer & Hanson, Inc., Los Angeles, Calif.
Spraco—Booths, nozzles, separators, strainers, washers. Spray Engineering Co., Somerville, Mass.
Spra-Rite—Nozzles. Binks Mfg. Co., Chicago, Ill.
Spray-Acoustic—Insulation. Sprayo Flake Co., Chicago, Ill.
Spraywheel—Air washers. Mountain States Equipment Co., Denver, Colo.
Springin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Square-Heat—Boilers. Kewanee Boiler Corp., Kewanee, Ill.
Stabilflo—Valves. Foxboro Co., Foxboro, Mass.
Stack-Head—Dampers. Air Control Products, Inc., Coopersville, Mich.
Sta-Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Stainlend—Electrodes. Arcos Corp., Philadelphia, Pa.
Stainweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Standard—Ventilators. Burt Mfg. Co., Akron, O.
Standardaire—High pressure blowers. Read Standard Corp., Blower-Stoker Div., Erie, Pa.
Standco—Bearings. Standard Pressed Steel Co., Jenkintown, Pa.
Standforated—Grilles. Standard Stamping & Perforating Co., Chicago, Ill.
Starbird—Pressure and vacuum switches. Meletron Corp., Los Angeles, Calif.
Star-O-Zone—Ozone apparatus. Norwood Associated Engineers Inc., Springfield, Mass.
Star-Quality—Nipples. Star Tubular Products Co., Chicago, Ill.
Statick—Ventilators. Hirschman-Pohle Co., Inc., Le Roy, N. Y.
Staxauster—Roof ventilators. Allen Ventilator Div., Production Planning Co., Rochester, Mich.
Staynew—Filters. Dollinger Corp., Rochester, N. Y.
Stazin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Steamheat—Heating systems, valves. Radiator Valve Co. of America, Philadelphia, Pa.
Steam-Pak—Steam generator unit, heaters. York-Shipley, Inc., York, Pa.
Steelbestos—Metal sheets. American Steel Band Co., Pittsburgh, Pa.
Steen—Cutters, pipe cleaning machines. Continental Machine Co., Chicago, Ill.
Sterilamp—Lamps. Westinghouse Electric Corp., Pittsburgh, Pa.
Sterlco—Controls, pumps, strainers, regulators, traps, valves. Sterling, Inc., Milwaukee, Wis.
Sterling—Compressors, condensers, valves, pipe coils. Reynolds Mfg. Co., Springfield, Mo.
Stictite—Cement. Refractory & Insulation Corp., New York, N. Y.
Stillson—Pipe wrenches. Erie Tool Works, Erie, Pa.
Stillson—Pipe wrenches. Trimont Mfg. Co., Div. of Aetna Industrial Corp., Roxbury, Mass.
Stok-A-Fire—Stokers. Automatic Firing Corp., St. Louis, Mo.
Stokerator—Stokers. Northern Steel & Stoker Corp., Peoria, Ill.
Stokerelay—Relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Stokol—Burners, stokers. Diamond Iron Works, Inc., Minneapolis, Minn.
Stonewall—Board and sheets. Ruberoid Co., New York, N. Y.
Storm Shade—Windows. Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
Strahman—Boiler gage cocks, valves. Klingerit Inc., New York, N. Y.
Straitflo—Strainers. Hays Mfg. Co., Erie, Pa.
Streamjet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Streamline—Couplings, cutters, fittings, heat exchangers, manifolds, nipples, pipe, strainers, tubing, unions, valves. Mueller Brass Co., Port Huron, Mich.
Streamliner—Registers. Auer Register Co., Cleveland, O.
Streamliner—Belting. Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Stronghold—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Studin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Stud-Pak—Insulation. United States Mineral Wool Co., South Milwaukee, Wis.
Sturdybender—Power brakes. Bath Co., Cyril, The, Cleveland, O.
Submersion—Boilers, water heaters. Stout & Sons, David, St. Louis, Mo.
Sullivan—Controls. Cole-Sewell Engineering Co., St. Paul, Minn.
Sunrad—Direct radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Super Air Screws—Fans. Marathon Electric Mfg. Corp., Wausau, Wis.
Supercutno—Packing. Greene, Tweed & Co., North Wales, Pa.
Super-deLavaud—Pipe. U. S. Pipe & Foundry Co., Burlington, N. J.
Superector—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Superex—Insulation. Johns-Manville, New York, N. Y.
Super-Felt—Insulation. Johns-Manville, New York, N. Y.
Superfin—Furnaces. American Foundry & Furnace Co., Bloomington, Ill.
Super-Fine—Insulation. Libbey-Owens-Ford Glass Co., Toledo, O.
Superflo—Heaters. Payne Furnace Div., Affiliated Gas Equipment Inc., Monrovia, Calif.
Superflux—Solder. Paul-Lewis Laboratories, Inc., Milwaukee, Wis.
Superheat—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Superior—Fans. American Foundry & Furnace Co., Bloomington, Ill.
Superior—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Super-Power—Drives. Baldwin Belting, Inc., New York, N. Y.
Superratchet—Ratchet Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Superrench—Tools. Williams & Co., J. H., Buffalo, N. Y.
Superseal—Fittings. Grinnell Co., Inc., Providence, R. I.
Super 7—V belts. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Super Silvertop—Traps. The V. D. Anderson Co., Cleveland, O.
Super "66"—Insulation. Eagle-Picher Co., Cincinnati, O.
Supersheat—Gaskets. Greene, Tweed & Co., North Wales, Pa.
Super T—Systems. Tork Clock Co., Mount Vernon, N. Y.
Supertan—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Supertemp—Insulation. Eagle-Picher Co., Cincinnati, O.
Supertherm—Heating systems. Ross Engineering Corp., J. O., New York, N. Y.
Super Thermo Stucco—Cement. Chicago Fire Brick Co., Chicago, Ill.
Super-Vacuum Vent—Roof ventilators. Octagon Ventilator Co., Chicago, Ill.
Super X—Sheets. Western Brass Div. of Olin Industries, Inc., East Alton, Ill.
Super X—Coatings. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Sureclor—Feeders. Paddock Engineering Co., of Texas, Dallas, Tex.
Sure Return—Condensation return pumps. Chicago Pump Co., Chicago, Ill.
Sureweld—Electrodes, welders. National Cylinder Gas Co., Chicago, Ill.
Surfamax—Pipe line filters. Micro Metallic Corp., Glen Cove, N. Y.
Sutco—Motors. Sutton Corp., O. A., Wichita, Kan.
Sweatflow—Valves. Quality Specialty Co., Inc., Philadelphia, Pa.
Sylphon—Steam traps. Webster & Co., Warren, Camden, N. J.
Synchro—Valves. The Bristol Co., Waterbury, Conn.
Synchro-Lectric — Viscosimeters. Brookfield Engineering Laboratories, Inc., Stoughton, Mass.
Synchro-Meter—Meters. Bailey Meter Co., Cleveland, O.
Synchron—Motors. Hansen Mfg. Co., Inc., Princeton, Ind.
Synchro-Thermetron—Heating systems. Whittington Pump & Engineering Corp., Indianapolis, Ind.
Synchrotie—Recorders. Westinghouse Electric Corp., Pittsburgh, Pa.
Syncretizer—Unit ventilators. Nesbitt, Inc., John J., Philadelphia, Pa.
Syncrogear—Speed reducers. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Syndolag—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.

Syphonaire—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.

T. N.—Valves. Imperial Brass Mfg. Co., Chicago, Ill.
T. T.—Smoke guns. Hill, E. Vernon & Co., Chicago, Ill.
Tabasco—Water heaters. Kewanee Boiler Corp., Kewanee, Ill.
Tag—Hygrometers, gages, indicator-controllers, operators, psychrometers, recorders, regulators, thermometers, valves. Tagliabue Instruments Div. Weston Electrical Instrument Corp., Newark, N. J.
Tampin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Tanco—Insulation, duct, sound deadening. Thompson & Co., Oakmont, Pa.
Tank-Kleen—Fuel oil treatment. Celco Corp., New York, N. Y.
Tank-O-Meter—Gages, indicators. Uehling Instrument Co., Paterson, N. J.
Tanktrol—Regulators. Automatic Control Co., St. Paul, Minn.
Tannate—Belting, packing. Rhoads & Sons, Sons, J. E., Philadelphia, Pa.
Tannate-Rockwood—Belt drives. Rhoads & Sons, J. E.,Philadelphia, Pa.
Tasil—Furnace cement. Taylor Sons Co., Charles, Cincinnati, O.
Tayco—Furnace and refractory cement, refractories. Taylor Sons Co., Charles, Cincinnati, O.
TEG—Humidifiers, sterilizing units. National Air Conditioning Inc., Johnstown, Pa.
Teksag Colloid—Boiler cleaning compounds. Agnew & Tomlinson, Long Island City, N. Y.
Tektor—Switches. Fielden Instrument Corp., Philadelphia, Pa.
Telecator—Gages, recorders and recorder-controllers. Automatic Control Co., St. Paul, Minn.
Telemaster—Relays. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Tellevel—Switches. Stephens-Adamson Mfg. Co., Aurora, Ill.
Tellite—Alarms. Rochester Mfg. Co., Inc., Rochester, N. Y.
Teltru—Anemometers, gages. Hill, E. Vernon & Co., Chicago, Ill.
Tem-Clock (Electric)—Time switches. Penn Controls, Inc., Goshen, Ind.
Temflex—Plastic tubing. Irvington Varnish & Insulator Co., Irvington, N. J.
Temlok—Insulation. Armstrong Cork Co., Lancaster, Pa.
Tempmaster—Thermostats. Crown Controls Co., Inc., New Bremen, O.
Tempoint—Thermometers. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Temproof—Bases and pads. Lord Mfg. Co., Erie, Pa.
Tempscribe—Recorders. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Temptrol—Insulation. Badham Insulation Co., Inc., Birmingham, Ala.
Tensulate—Insulation. Tennessee Products and Chemical Corp., Nashville, Tenn.
Terra Therm—Air conditioning units. Webber Engineering Corp., Indianapolis, Ind.
Testite—Fittings. General Fittings Co., Providence, R. I.
Texiron—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texrope—V-belt drives, pulleys, v-belts. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texslide—Motor bases. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texsteel—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texolite—Tubing, General Electric Co., Chemical Dept., Pittsfield, Mass.
Tharco—Cement. The Armstrong Co., Detroit, Mich.
Thawzone—Dehydrant and acid neutralizer. Highside Chemicals Co., Clifton, N. J.
Therma-Koil—Tubing. Thermapanels, Inc., San Jose, Calif.
Thermalbridge—Thermometers. Thompson Research & Mfg. Co., Davenport, Fla.
Thermal Electric—Heaters, pipe, preheaters, systems, transformers. Fluid Systems, Inc., New Haven, Conn.
Thermalfin—Unit coolers. Thermal Co., Inc., Milwaukee, Wis.
Thermatrol—Valves. Schnacke, Inc., Evansville, Ind.
Thermatube—Pre-insulated pipe. Flexible Tubing Corp., Guilford, Conn.
Therm-Cote—Radiation. Tilco-Fin-Tubing Div., of David E. Kennedy, Inc., Brooklyn, N. Y.
Thermidaire—Furnaces, heaters. Campbell Heating Co., E. K., Kansas City, Mo.
Thermo—Expansion valves. Alco Valve Co., St. Louis, Mo.
Thermo—Heaters. American Furnace Co., St. Louis, Mo.
Thermobank—Systems. Kramer Trenton Co., Trenton, N. J.
Thermobloc—Air heaters. Prat-Daniel Corp., East Port Chester, Conn.
Thermochek—Controls. Bell & Gossett Co., Morton Grove, Ill.
Thermo-Draulik—Operators, regulators. Perfex Corp., Milwaukee, Wis.
Thermodrive—Speedchangers, pulleys and sheaves. Webster Electric Co., Racine, Wis.
Thermoflex—Strainers, heating systems, radiator orifices, traps, valves. Cashin Co., W. D., Boston, Mass.
Thermoflex—Radiator orifices. Grinnell Co., Inc., Providence, R. I.
Thermo-Flow—Heat exchangers. Thermal Industries, San Francisco, Calif.
Thermofuel—Furnaces. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermogas—Furnaces. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermo Grip—Torches. Ideal Industries, Inc., Sycamore, Ill.
Thermoguide—Thermometers. Taylor Instrument Companies, Rochester, N. Y.
Thermo-Humidigraph — Recorder-controllers. Bristol Co., The, Waterbury, Conn.
Thermoil—Furnaces, unit heaters. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermoil-Granodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Thermolator—Valves. Triplex Heating Specialty Co., Inc., Peru, Ind.
Thermolier—Unit heaters. Grinnell Co., Inc., Providence, R. I.
Thermopane—Windows. Libbey-Owens-Ford Glass Co., Toledo, O.
Thermoswitch—Thermostats. Fenwal, inc., Ashland, Mass.
Therm-o-tile—Conduit. Porter & Co., Inc., H. W., Newark, N. J.
Therm-otrols—Thermometers. Wheelco Instruments Co., Chicago, Ill.
Thermovent—Unit ventilators. Nesbitt, Inc., John J., Philadelphia, Pa.
Thermovoir—Water heaters. Bell & Gossett Co., Morton Grove, Ill.
Thermwire—Conductors and Panels. Wiegand Co., Edwin L., Pittsburgh, Pa.
Thin Man—Registers. Register & Grille Mfg Co., Inc., Brooklyn, N. Y.
Thor—Belting. Goodyear Tire & Rubber Co., Akron, O.
Thor—Drills, Hose clamps, pumps, reamers, shears, valve reseaters. Independent Pneumatic Tool Co., Aurora, Ill.
Thorobred—V belts and v belt drives. Dayton Rubber Co., Dayton, O.
Thredolets—Fittings. Bonney Forge & Tool Wks., Allentown, Pa.
3C—Motor controls. Clark Controller Co. Cleveland, O.
Thrift—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Thriftymatic—Draft regulators. Engineered Products Co., Philadelphia, Pa.
Throway—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Thur-Ma-Lox—Coatings. Dampney Co., The, Hyde Park, Boston, Mass.
Tico—Galvanized Sheet Steel. Inland Steel Products Co., Milwaukee, Wis.
Ticosteam—Boilers. Titusville Iron Works Co., The, Titusville, Pa.
Ticotherm—Boilers. Titusville Iron Works Co., The, Titusville, Pa.
Tilt Trap—Steam traps. Nason Co., Clarkston, Mich.
Timercoid—Time switches. Mercoid Corp., Chicago, Ill.
Timerelay — Relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Time-O-Stat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Time Saver—Damper regulators. Goese Mfg. Co., Milwaukee, Wis.
Tin-Ezy—Coatings, solder and fluxes. Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Tin-Loy—Solder. Eagle-Picher Co., Cincinnati, O.
Tiny—Traps. Nason Co., Clarkston, Mich.
Titan—Traps. Nason Co., Clarkston, Mich.
Tite Seal—Cement and compounds. Radiator Specialty Co., Charlotte, N. C.
Tom Thumb—Pipe machines. Oster Mfg. Co., Cleveland, O.
Toolweld—Electrodes. Lincoln Electric Co. Cleveland, O.
Torchweld—Regulators, valves, welding and cutting apparatus. National Cylinder Gas Co., Chicago, Ill.
Torkflash—Wrenches. Blackhawk Mfg. Co., Milwaukee, Wis.
Tork Master—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Torkotherm—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Torpedo—Dehydrators, filters. Imperial Brass Mfg. Co., Chicago, Ill.
Torqometer—Torque indicating wrenches. Snap-on Tools Corp., Kenosha, Wis.
Torq-Stop—Wrenches. Richmont, Inc., San Gabriel, Calif.
Torque-Arm—Reducers. Dodge Mfg. Corp., Mishawaka, Ind.
Trace—Refrigerant leak detectors. Highside Chemicals Co., Clifton, N. J.
Transaire—Transmitters. Taylor Instrument Companies, Rochester, N. Y.
Transflex—Plastic tubing. Irvington Varnish and Insulator Co., Irvington, N. J.
Transite—Conduit, pipe, ducts and duct fittings, refractories, sheets and board. Johns-Manville, New York, N. Y.
Transparent—Analyzers, gages, manometers. Dwyer Mfg. Co., F. W., Chicago, Ill.
Trap-Dri—Dehydrators. A-P Controls Corp., Milwaukee, Wis.
Trap-it—Filters. A-P Controls Corp., Milwaukee, Wis.
Tray—Cooling towers. New England Cooling Tower Co., Boston, Mass.
Treet-O-Control—Steam system and water treatment. % Proportioneers, Inc. %, Providence, R. I.
Treet-O-Unit—Feeders, pumps. % Proportioneers, Inc. %, Providence, R. I.
Trentweld—Tubing. Trent Tube Co., East Troy, Wis.
Triad—Stocks and dies. Nye Tool & Machine Co., Chicago, Ill.
Tri-Clad—Motors. General Electric Co., Apparatus Dept., Schenectady, N. Y.
Trident—Meters. Neptune Meter Co., New York, N. Y.
Tri-Flex—Registers, grilles. Tuttle & Bailey, Inc., New Britain, Conn.
Tri-Flux—Solder. Wolfe-Kote Co., Inc., Sheboygan, Wis.
Trimo—Cutters, tongs, vises, wrenches. Trimount Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Trimtherm—Thermostats. General Controls Co., Glendale, Calif.
Triple—Fittings. Parker Appliance Co., The Cleveland, O.
Triple-A—Enamels and lacquers, protective coatings. Quigley Co., Inc., New York, N. Y.
Triple Duty—Heating systems. Bell & Gossett Co., Morton Grove, Ill.
Triple-Seal—Fittings. Imperial Brass Mfg. Co., Chicago, Ill.
Triple Seal—Circulators. Standard Electric Mfg. Co., West Berlin, N. J.
Triplex—Stocks and dies. Nye Tool Co., Chicago, Ill.
Tripl-Mix—Cement. Krehbiel Co., J. H., Chicago, Ill.
Tri-Rotor—Pumps. Yale & Towne Mfg. Co., Stamford, Conn.
Tri-trol—Regulators, Marsh Heating Equipment Co., Skokie, Ill.
Triumph—Gages and indicators. Boston Auto Gage Co., Pittsfield, Mass.
Trojan—Boilers. Burnham Corp., Boiler Div., Irvington, N. Y.
Trojan—Stokers. Auburn Burner Co., Auburn Ind.
Tropelite—Coatings. Tropical Paint & Oil Co., Cleveland, O.
Tropic-Breeze—Air conditioning units. Dalzen Mfg. Co., St. Clair, Mich.
Tropilux—Enamels and lacquers. Tropical Paint & Oil Co., Cleveland, O.
Tru-Air—Air conditioning units. Blazer, M., & Son, Passaic, N. J.
Truflex—Bi-metals. General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Truflex—Drives, V. Belt. Gates Rubber Co., The, Denver, Colo.
Truliradiant—Gas burners. Gordon & Piatt, Winfield, Kan.
Truliradiant—Gas burners. Gold Top Heating. Inc., Butte, Mont.
Trumark—Protractor for marking pipe. Tru-Line Corp., Los Angeles, Calif.
Try-Me—Regulators, strainers, valves. Tryco Products, Inc., Westfield, Mass.
Tubecote—Protective coatings. Wilhelm Co., A., Reading, Pa.
Tubejet—Compressors, ejector type vacuum pump. Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Tube-Tite—Pipe hangers and supports. Titchener, E. H. & Co., Binghamton, N. Y.
Tuff-Bond—Adhesives, cement. Moore Inc., Goodloe E., Danville, Ill.
Tufflex—Insulation. Wood Conversion Co., St. Paul, Minn.
Tuf-flex—Gage and sight glasses. Libbey-Owens-Ford Glass Co., Toledo, O.
Tuf-On—Protective coatings. Brooklyn Varnish Mfg. Co., Brooklyn, N. Y.
Tulox—Plastic pipe and tubing. Extruded Plastics, Inc., Norwalk, Conn.
Tumblin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Turbine Driven—Heaters. Wing Mfg. Co., L. J., New York, N. Y.
Turblent-Aire—Overfire air jets. Canton Stoker Corp., Canton, O.
Turbo—Air washers, spray nozzles. Bayley Blower Co., Milwaukee, Wis.
Turbo-Flo—Water chillers. Drayer & Hanson, Inc., Los Angeles, Calif.
Turbo Vane—Fans and blowers. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Turbulaire—Dryers. Western Precipitation Corp., Los Angeles, Calif.
Turret—Pumps. Yeomans Bros. Co., Chicago, Ill.
Tu-way—Radiation. Brown Products Co., Forest Hills, N. Y.

20th Century—Bearings. Roller Bearing Co., of America, Trenton, N. J.
Twin Contact—Controls, switches, thermostats. Perfex Corp., Milwaukee, Wis.
Twindow—Heat insulating windows. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Twin G-Fin—Preheaters. Griscom-Russell Co., The, New York, N. Y.
Twin-Line—Pumps. Cooper-Bessemer Corp., The, Mt. Vernon, O.
Twin Seal—Check valves, gage testers. Mansfield & Green, Cleveland, O.
Tygon—Protective coatings, plastic tubing. U. S. Stoneware Co., New York, N. Y.
Tylox—Pipe couplings. United States Stoneware Co., New York, N. Y.
Tynit—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.

U S—Fittings, flanges, tank plugs. U. S. Plug & Fitting Co., Wellington, O.
U. S.—Heaters. United States Radiator Corp., Detroit, Mich.
US-Capitol—Boilers, hangers or brackets, heaters, radiation. United States Radiator Corp., Detroit, Mich.
US-Capitolaire—Air conditioning units. United States Radiator Corp., Detroit, Mich.
USG—Louvers and shutters. United States Gypsum Co., Chicago, Ill.
U. S. S.—Angles, sheets. United States Steel Co., Pittsburgh, Pa.
U. S. S.—Pipe, tubing. National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
U-S-S—Sheets, angles. Columbia Steel Co., United States Steel Corp., Subsidiary, San Francisco, Calif.
USS—Sheets. Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
UTA—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Ugasco—Gaskets. United States Gasket Co., Camden, N. J.
U-Loy—Sheets. Republic Steel Corp., Cleveland, O.
Ultralite—Insulation. Gustin-Bacon Mfg. Co., Kansas City, Mo.
Unaflow—Steam engines. Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Unarco—Insulation, gaskets, packing, Insulating cement. Union Asbestos & Rubber Co., Chicago, Ill.
Unbrako—Repair plugs. Standard Pressed Steel Co., Jenkintown, Pa.
Unibestos—Insulation. Union Asbestos & Rubber Co., Chicago, Ill.
Unichrome—Enamels and lacquers. United Chromium, Inc., New York, N. Y.
Uniclosed—Electric motors. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Unicoils—Air conditioning unit. Clarage Fan Co., Kalamazoo, Mich.
Unicon—Refrigerating condensers. Kramer Trenton Co., Trenton, N. J.
Uniduct—Ducts and duct fittings. General Corporation, Minneapolis, Minn.
Uni-fin—Grilles, registers. Barber-Colman Co., Rockford, Ill.
Uniflare—Fittings. Scovill Mfg. Co., Waterbury, Conn.
Uniflex—Metal hose. Brockway Co., Naugatuck, Conn.
Uni-flo—Dampers, diffusers, grilles, registers. Barber-Colman Co., Rockford, Ill.
Uniflow—Oil burners. Ace Engineering Co., Chicago, Ill.
Unipack—Welding fume exhausters, centrifugal fans. American Machine Products Co., Marshalltown, Ia.
Uni-Pull—Flat belt drives. Rhoads & Sons, J. E., Philadelphia, Pa.
Unipump—Pumps. Weinman Pump Mfg. Co., Columbus, O.
Unishears—Electric shears. Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Unisorb—Bases and pads. Felters Company, The, Boston, Mass.
Unitair—Air compressors. Joy Mfg. Co., Pittsburgh, Pa.
Unitaire—Air conditioning units. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Unitem—Heaters. Bell & Gossett Co., Morton Grove, Ill.
Unitherm—Unit heaters. Clarage Fan Co., Kalamazoo, Mich.
UniTrane—Air conditioning units. Trane Co., The, La Crosse, Wis.
Universal—Benders. Hossfeld Mfg. Co., Winona, Minn.
Universal Burners. Dalzen Mfg. Co., St. Clair, Mich.
Universal—Cast iron pipe. Central Foundry Co., Newark, N. J.
Universal—Centrifugal pumps. Bell & Gossett Co., Morton Grove, Ill.
Universal—Gas and oil burners. Mettler Co., Inc., The, Los Angeles, Calif.
Universal—Packing. Johns-Manville, New York, N. Y.
Universal—Pipe cutters. Nye Tool Co., Chicago, Ill.
Universal—Regulators. Dockson Corp., Detroit, Mich.
Universal Unaflow—Engines. Skinner Engine Co., Erie, Pa.
Uni-Wash—Dust collectors. Newcomb-Detroit Co., Detroit, Mich.
Upson—Bolts and studs. Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
usAIRco—Air conditioning equipment, blowers, condensers, dehumidifiers, fans, grilles, heaters. United States Air Conditioning Corp., Minneapolis, Minn.
Uskon—Conductors. United States Rubber Co., New York, N. Y.
Utilitube.—Aluminum tubing. Aluminum Co. of America, Pittsburgh.
Utility—Blowers. American Blower Corp., Detroit, Mich.
Utility—Roof ventilators. Arex Co., Chicago.
Utility—Heaters. Wing Mfg. Co., L. J., New York, N. Y.

V*S—Changers. Reliance Electric & Engineering Co., Cleveland, O.
Vacumatic—Ejectors, pumps. Whittington Pump & Engineering Corp., Indianapolis.
Vacuumstat—Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Vad—Cooling towers. Young Radiator Co., Racine, Wis.
Vairflo—Cooling towers. Marley Co., Inc., The, Kansas City, Mo.
Valcalox—Damper regulators. Young Regulator Co., Cleveland, O.
Valdura—Enamel. American-Marietta Co., Chicago, Ill.
Valvactor—Valve operators. Foxboro Co., Foxboro, Mass.
Valvent—Roof ventilators, Swartwout Co., Cleveland, O.
Valvrator—Valves. Fischer & Porter Co., Hatboro, Pa.
Vape-Sorber—Filters, Selas Corp. of America, Philadelphia, Pa.
Vapomaster—Air sterilizing units. Robertson Sons, Inc., M. F., Lansdowne, Pa.
Vapomatic—Sterilizing units. Robertson Sons, Inc., M. F., Lansdowne, Pa.
Vaporene—Corrosion inhibition. Metropolitan Refining Co., Inc., Long Island City, N. Y.
VapoRette—Sterilizing units. Robertson Sons, Inc., M. F., Lansdowne, Pa.
Vapor-Clarkson—Heating and process boilers. Vapor Heating Corp., Chicago, Ill.
Vaporstat—Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Va-pur-izer—Room type unit humidifiers. Crowell & Dunn, Inc., New York, N. Y.
Varidrive—Speed changers. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Varipitch—Pulleys and sheaves. Gates Rubber Co., The, Denver, Colo.
Vari-Pitch—Speed changers, pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Vari-Vac—Heating systems. Dunham Co., C. A., Chicago, Ill.
Vari-Vent—Valves. Dole Valve Co., Chicago, Ill.
Vaultmaster—Air conditioning units. Haertel Co., Walter, Minneapolis, Minn.
Veeco—Leak detectors. Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
Vee Jet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Veelos—V-belts. Manheim Mfg. & Belting Co., Manheim, Pa.
Velometer—Air velocity meters, anemometers. Illinois Testing Laboratories, Inc., Chicago, Ill.
Ventalarm—Alarms, gages. Scully Signal Co., Cambridge, Mass.
Ventfab—Connections, duct, flexible. Iden Associates, Chicago, Ill.
Vento—Traps. Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
Vent-Rite—Air valves. Anderson Products, Inc., Cambridge, Mass.
Ventube—Ducts and duct fittings. E. I. du Pont de Nemours & Co., Inc., Fabrics & Finishes Dept., Wilmington, Del.
Ventura—Fans. American Blower Corp., Detroit, Mich.
Venturafin—Unit heaters. American Blower Corp., Detroit, Mich.
Venturi—Fan housings. Commercial Shearing & Stamping Co., Youngstown, O.
Venturi—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Venturi-Flo—Air diffusers. Barber-Colman Co., Rockford, Ill.
Vent-Vac—Heating systems. Anderson Products, Inc., Cambridge, Mass.
Verco—Insulating cement. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Vercoustic—Insulation. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Vermiculite—Insulation. International Vermiculite Co., Girard, Ill.
Vernier-Set—Time switches. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Versalend—Arc welding electrodes. Arcos Corp., Philadelphia, Pa.
Versa-Liners—Blue and white print machines. Peck & Harvey, Chicago, Ill.
Vertical—Unit heaters. American Blower Corp., Detroit, Mich.
Vertiflow—Unit heaters. Young Radiator Co., Racine, Wis.
V-Flat—Pulleys and sheaves. Dayton Rubber Co., Dayton, O.
Vibracork—Bases and pads. Korfund Co., Inc., Long Island City, N. Y.
Vibracork—Vibration absorbers. Finn & Co., Inc., T. R., New York, N. Y.
Vibrasafe—Absorbers. Pleasantaire Corp., Washington, D. C.
Vibrashock—Bases and pads. Robinson Aviation, Inc., Vibrashock Div. Teterboro, N. J.
Vibra-sorber—Vibration absorbers. Chicago Metal Hose Corp., Maywood, Ill.
Vibro-Bar—Bases and pads. Korfund Co., Inc., Long Island City, N. Y.
Vibro-Hangers. Pipe hangers and supports. Korfund Co., Inc., Long Island City, N. Y.
Vibro Insulators—Bases. Goodrich Co., B. F., Akron, O.
Vibro-Isolator—Bases and pads. Korfund Co., Inc., Long Island City, N. Y.
Victor—Traps. Wright-Austin Co., Detroit.
Victory—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Victron—Electric motors. Victor Electric Products, Inc., Cincinnati.
Vim—Gaskets, leather packing. Houghton & Co., E. F., Philadelphia, Pa.
Vim Tred—Leather belting. Houghton & Co., E. F., Philadelphia, Pa.
Vinyl—Coatings. Gates Engineering Co., Wilmington, Del.
Visaflame—Controls. Mercoid Corp., The, Chicago, Ill.
Visco—Preheaters. Crotty Mfg. Corp., Long Island, N. Y.
Viscorator—Viscosimeters. Fischer & Porter Co., Hatboro, Pa.
Visi Flo—Sight glasses. O P W Corp., Cincinnati, O.
Visi—Float. Air filter gages. F. W. Dwyer Mfg. Co., Chicago.
Vistand—Vise stands. Armstrong Mfg. Co., Bridgeport, Conn.
Vitalloy—Wrenches. Billings & Spencer Co., Hartford, Conn.
Vitra-Carlite—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Vitricel—Refractories. Carey Mfg. Co., Philip, The, Lockland, Cincinnati, O.
Vitriram—Furnace cement. U. S. Stoneware Co., New York, N. Y.
Vix-Syn—Rubber and synthetic packing. Houghton & Co., E. F., Philadelphia, Pa.
V-Meth-L—Refrigerants. Virginia Smelting Co., West Norfolk, Va.
Voladjuster—Dampers. Barber-Colman Co., Rockford, Ill.
Volcano—Ventilators. Iwan Brothers, South Bend, Ind.
Volocitrol—Louvers, regulators. Barber-Colman Co., Rockford, Ill.
Vornado—Fans, air conditioning units. Sutton Corp., O. A., Wichita, Kan.
Vortex—Pumps. Lawrence Pump & Engine Co., Lawrence, Mass.
Vortex—Nozzles. Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
V-to-V—Pulleys and sheaves. Dayton Rubber Co., Dayton, O.
Vulcalock—Fittings, pipe, tanks, valves. Goodrich Co., B. F., Akron, O.
Vulcan—Stands, tongs, vises. Williams & Co., J. H., Buffalo, N. Y.
Vulcan—Stokers. Canton Stoker Corp., Canton, O.
Vulcan Superior—Tongs, vises. Williams & Co., J. H., Buffalo, N. Y.
Vulco—Belts, drives, pulleys. Gates Rubber Co., Denver, Colo.
Vulco Mount—Pulleys. Gates Rubber Co., Denver, Colo.
Vynal—Coatings. Watson-Standard Co. Pittsburgh, Pa.
Vyncote—Coatings. Watson-Standard Co. Pittsburgh, Pa.

W. & McD.—Strainers. Watson & McDaniel Co., Philadelphia, Pa.
W-S—Fittings. Watson-Stillman Co., Roselle, N. J.
W & T—Anemometers, feeders, gages, indicators, hygrometers, dew point recorders, meters, relays. Wallace & Tiernan Co., Inc., Newark, N. J.
W & W—Pipe hangers. Western Wire Products Co., St Louis, Mo.
Wakefield—Fittings, pipe, pumps, tanks and valves. Lead Lined Iron Pipe Co., Wakefield, Mass.
Walco-Parmelee—Wrenches. Walworth Co., New York, N. Y.
Walltube—Radiator brackets. Arjac Products Inc., Rochester, N. Y.
Walseal Silbraz—Fittings, valves. Walworth Co., New York, N. Y.
Walvector—Radiations. Webster & Co., Warren, Camden, N. J.
Warco—Combustion chambers, refractories. Walsh Refractories Corp., St. Louis, Mo.
Warco—Valves. Bridgeport Brass Co., Bridgeport, Conn.

Warco—Fuel oil treatment. Warren Refining & Chemical Co., The, Cleveland, O.
Warcolite—Enamels and lacquers. Warren Refining & Chemical Co., The, Cleveland, O.
Warnock—Vises, wrenches. Lowell Wrench Co., Worcester, Mass.
Wat-a-mat—Water meters. Pfening Co., Fred D., Columbus, O.
Watco—Cooling towers, humidifiers, spray nozzles, spraying systems. Water Cooling Corp., New York, N. Y.
Water-Boy—Feeders, alarms, valves. Maid-O'-Mist, Inc., Chicago, Ill.
Water-King—Pumps. Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Water-Maker—Water heaters. Catskill Metal Works, Inc., Catskill, N. Y.
Waterspar—Enamels and lacquers. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Watrola—Water heaters. George E. Swett & Co., San Francisco, Calif.
Way Loctor—Doors and panels. Walsh, The, L. M., Co., Boston, Mass.
Wear-Proof—Pumps. Schneible Co., Claude B., Detroit, Mich.
Wearweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Weather-Chron—Time switches. Automatic Devices Co., Inc., Western Springs, Ill.
Weather-Damper—Operators, regulators. Automatic Devices Co., Inc., Western Springs, Ill.
Weather-Flo—Thermostats. Automatic Devices Co., Inc., Western Springs, Ill.
Weathermaker—Unit coolers, unit air conditioners. Carrier Corp., Syracuse, N. Y.
Weathermaster—Unit air conditioners. Carrier Corp., Syracuse, N. Y.
Weather-Man—Regulators, switches, thermostats. Automatic Devices Co., Inc., Western Springs, Ill.
Weatherstat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Webco—Brakes. Webb Machine & Tool Co., Imperial, Pa.
Webster-Nesbitt—Unit heaters. Webster & Co., Warren, Camden, N. J.
Webster-Nesbitt "Little Giant"—Unit heaters. Nesbitt, Inc., John J., Philadelphia, Pa.
Weco—Gas burners. Webster Engineering Co., Tulsa, Okla.
Wedgbelt—V belts and v-belt drives, pulleys. American Pulley Co., Philadelphia, Pa.
Wee Scot—Titusville Iron Works Co., The, Titusville, Pa.
Weir—Stokers. Meyer Furnace Co., The, Peoria, Ill.
Weiralead—Lead alloy coated sheets. Weirton Steel Co., Weirton, W. Va.
Weir-Meyer—Furnaces. Meyer Furnace Co., The, Peoria, Ill.
Weirzin—Electrolytic zinc coated sheets. Weirton Steel Co., Weirton, W. Va.
Weldells—Welding fittings. Taylor Forge & Pipe Works, Chicago, Ill.
Weldolets—Fittings. Bonney Forge & Tool Works, Allentown, Pa.
WesCo—Solenoids. West Coast Electric Mfg. Co., Los Angeles, Calif.
Western—Fans, furnaces, heaters. International Sales Co., San Francisco, Calif.
Westernaire—Fans. Western Engineering & Mfg. Co., Los Angeles, Calif.
Western Rotary—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.
Westo—Water treatment. Western Chemical Co., Kansas City, Mo.
Wheeler-Economy—Ejectors, pumps. Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whirlcone—Spray nozzles. Water Cooling Equipment Corp., St. Louis, Mo.
Whirljet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Whisper-Quiet—Heaters. Zink Co., John, Tulsa, Okla.
Whitson—Steam traps. Healy Ruff Co., St. Paul, Minn.
Wilco—Bi-metals. Wilson Co., H. A., The, Newark, N. J.
Wilco—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Williams-Hager—Valves. Williams Gauge Co., The, Pittsburgh, Pa.
Wilmington—Air compressors. Electric Spray-it Co., The, Sheboygan, Wis.
Windial—Anemometers. Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Wind Master—Ventilators. Acme Equipment Co., Muskogee, Okla.
Windmotor—Roof ventilators. Airecon Industries, Detroit, Mich.
Wind-O-Cool—Fans. Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.
Wind-O-Vent—Window ventilator and filter units. Reed Unit-Fans, Inc., New Orleans, La.
Wingfoil—Ventilators. Wing Mfg. Co., L. J., Linden, N. J.
Winkler—Burners, stokers. U. S. Machine Corp., Lebanon, Ind.
Winter-Chaser—Air conditioning units, furnaces, heaters. Campbell Heating Co., Des Moines, Ia.
Wissco—Grilles. Wickwire Spencer Steel Div. of Colorado Fuel & Iron Corp., New York, N. Y.
Witch—Bolts, clamps, hangers, protectors. Carpenter & Paterson, Inc., East Boston, Mass.
Wolf-Linde—Compressors, condensers, fittings, valves. Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Wolverine—Heat exchangers, unit heaters, air conditioning units. Airecon Industries, Detroit, Mich.
Wonder—Tubing benders. American Pipe Bending Machine Co., Inc., Poultney, Vt.
Wondaire—Heaters. Cox Mfg. Co., Ridgeville, Ind.
Wovenstone—Pipe insulation. Union Asbestos & Rubber Co., Cicero, Ill.
Wrap-On—Pipe insulation. Gro-Quick Co., Chicago, Ill.
X-L—Gaskets, packing. Excelsior Leather Washer Co., Rockford, Ill.
Xacto—Meters. Bowser, Inc., Fort Wayne, Ind.
"X" Boilerliquid—Compounds. X Laboratories, Inc., New York, N. Y.
"X" Flush-Rustoff—Boiler cleaning compounds. X Laboratories, Inc., New York, N. Y.
"X" Pipejoin—Cement and compounds. X Laboratories, Inc., New York, N. Y.
Xit—Ventilators. Iona Ventilator Co., Inc., Philadelphia, Pa.

Yager's—Solder. Benson Co., Inc., Alex R., Hudson, N. Y.
Yarway—Alarms, clamps, expansion joints, recorders, nozzles, strainers, traps, valves. Yarnall-Waring Co., Philadelphia, Pa.
Yellow-Jacket—Heating boilers. Burnham Corp., Boiler Div., Irvington, N. Y.
Yemco—Water heaters. York Electric & Machine Co., York, Pa.
Yoloy—Pipe, sheet, tubing. Youngstown Sheet & Tube Co., Youngstown, O.
Yorkaire—Unit air coolers. York Corp., York, Pa.
York-Power—Oil burners. York-Shipley, Inc., York, Pa.

Zapon—Enamels and lacquers. Atlas Powder Co., North Chicago, Ill.
Z-Crete—Pipe insulation. Zonolite Co., Chicago, Ill.
Zephyrweld—Pipe fittings. Tri-Clover Machine Co., Kenosha, Wis.
Zero—Cement, refractories. Standard Fuel Engineering Co., Detroit, Mich.
Zerolite—Insulation. Johns-Manville, New York, N. Y.
Zig Zag—Heat exchangers. Stout & Sons, David, St. Louis, Mo.
Zinaloy—Zinc sheets. Matthiessen & Hegeler Zinc Co., La Salle, Ill.
Zincgrip—Sheets. Armco Steel Corp., Middletown, O.
Zincilate—Coatings. Industrial Metal Protectives, Inc., Dayton, O.
Zinc Soot—Soot destroyers. Tamms Industries, Inc., Chicago, Ill.
Zinodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Zipcoat—Corrosion shields. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Zircon—Furnace and refractory cement, refractories. Taylor Sons Co., Charles, Cincinnati, O.
Zoneair—Payne Furnace Div., Affiliated Gas Equipment Inc., Monrovia, Calif.
Zone-Master—Heating systems. General Heaters & Regulators Co., Chicago, Ill.
Zone-Pac—Heating systems. Barber-Colman Co., Rockford, Ill.

DIRECTORY SECTION
HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 3—MANUFACTURERS' ADDRESSES

A

A. & A. Register Co., 8327 Clinton Rd., Cleveland 9, O.
●A-J Mfg. Co., 2119 Washington St., Kansas City 8, Mo.
A-P Controls Corp., 2460 N. 32nd St., Milwaukee 10, Wis.
Abart Gear & Machine Co., 4828-36 W. 16th St., Chicago 50, Ill.
Acadia Synthetic Products Div., Western Felt Works, 4115 Ogden Ave., Chicago, Ill.
Accurate Sheet Metal Mfg. Works, 2336-40 Milwaukee Ave., Chicago 47, Ill.
Ace Engineering Co., 1435 W. 15th St., Chicago 8, Ill.
Acer & Whedon, Inc., Medina, N. Y.
Acheson Mfg. Co., Braddock P. O., Rankin, Pa.
Acker Organization, Inc., W. M., 3167 Fulton Rd., Cleveland 9, O.
Ackermann Mfg. Co., Wheeling, W. Va.
Acme Asbestos Covering & Flooring Co., 236 N. Elizabeth St., Chicago 7, Ill.
Acme Electric Welder Co., 2618 Fruitland Ave., Los Angeles 58, Calif.
Acme Equipment Co., 205-13 E. Broadway, Muskogee, Okla.
●Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich.
Acme Mfg. Co., State Rd. below Rhawn St., Holmesburg, Philadelphia 36, Pa.
Acme Refining Co., The, W. 56th & W. & L. E. Ry., Cleveland, O.
Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.
Acme White Lead & Color Works, 8250 St. Aubin Ave., Detroit 11, Mich.
Acorn Refining Co., 8001 Franklin Ave., Cleveland, O.
Acragage Corp., Wampus Lane, Milford, Conn.
Acro Mfg. Co., The, 2040 E. Main St., Columbus, O.
Acro Welder Mfg. Co., 1825 W. St. Paul Ave., Milwaukee 3, Wis.
Acrow, Inc., 155 Washington St., Newark, N. J.
Adam Electric Co., Frank, 3650 Windsor St., St. Louis, Mo.
Adams Co., The, E. 4th St., P. O. Box 268, Dubuque, Ia.
Adams Co., Inc., R. P., 225-7 E. Park Dr., Buffalo 17, N. Y.
Adams Mfg. Co., 1530 St. Clair Ave., Cleveland 3, O.
Adjustable Clamp Co., 417 N. Ashland Ave., Chicago 22, Ill.
Adelta Mfg. Co., Inc., 21 & Ellsworth, Philadelphia 46, Pa.
Advance Aluminum Castings Corp., 2742 W. 36th Pl., Chicago 32, Ill.
Advance Electric & Relay Co., 2435 N. Naomi St., Burbank, Calif.
Advance Fan & Blower Co., 3428 Bagley, Detroit, Mich.
●Aerco Corp., 214 Lafayette Pl., Englewood, N. J.
Aero-Coupling Corp., 3015 Winona Ave., Burbank, Calif.
●Aerofin Corp., 410 S. Geddes St., Syracuse 1, N. Y.
Aeroil Products Co., Inc., Wesley St., South Hackensack, N. J.
Aeromatic Propeller Dept., Koppers Co., Inc., Baltimore 3, Md.
Aeroquip Corp., 300 S. East Ave., Jackson, Mich.
Aerotec Corp., The, Greenwich, Conn.
Aerovent Fan Co., Inc., 710 E. Ash St., Piqua, O.
Agaloy Tubing Co., Springfield, O.
Agava Products, Inc., 34 Exchange Pl., Jersey City, N. J.
Aget-Detroit Co., 613 First National Bank Bldg., Ann Arbor, Mich.
Agnew Electric Co., Milford, Mich.
Agnew & Tomlinson, 10-26 Jackson Ave., Long Island City 1, N. Y.
Ahlberg Bearing Co., 3081 W. 47th St., Chicago 32, Ill.
Air-Aid Corp., 350 Fifth Ave., New York 1, N. Y.
Air Conditioning Engineering Co., 44 First St., Cambridge 41, Mass.
●Air Conditioning Products Co., 2340 W. Lafayette Blvd., Detroit 16, Mich.
Air Control Products, Inc., Coopersville, Mich.
Air Controls, Inc., Div. of Cleveland Heater Co., 2310 Superior Ave., Cleveland 14, O.
Aircraft Fitting Co., 1400 E. 30 St., Cleveland 14, O.
●Air Devices, Inc., 17 E. 42nd St., New York 17, N. Y.
Air Equipment Co., 1713 W. Carroll Ave., Chicago 12, Ill.
Air Equipment Co., 2730 Zuni St., Denver, Colo.
Air Filter Corp., 108 N. Water St., Milwaukee 2, Wis.
Air-Line Engineering Co., 4758 Warner Rd., Cleveland, O.
Air Purification Service, Inc., 136 Liberty St., New York, N. Y.
Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N. Y.
●Air & Refrigeration Corp., 475 Fifth Ave., New York 17, N. Y.
Air Vent Corp., 403 E. 62nd St., New York, N. Y.
Airecon Industries, 2536 14th St., Detroit 16, Mich.
Aire-Foile Fan & Blower Co., 2909 Central Ave., Detroit 9, Mich.
Airgard Mfg. Co., 362 W. Erie St., Chicago 10, Ill.
Airjet Ventilator Co., 380 Plumosa Dr., Pasadena 10, Calif.
Airkem, Inc., 241 E. 44 St., New York 17, N. Y.
Airmaster Corp., 4317 Ravenswood Ave., Chicago 13, Ill.
Air-Maze Corp., 5200 Harvard Ave.. Cleveland 5, O.
Air-O-Cel Co., 23622 Woodward Ave., Detroit 20, Mich.
Air-Stream Filter Corp., 2100 Washington Ave., St. Louis 3, Mo.
●Airtherm Mfg. Co., 711 S. Spring Ave., St. Louis 10, Mo.
Airwasher Corp., 1122 N. Washington Ave., Lansing, Mich.
Ajax Flexible Coupling Co., Westfield, N. Y.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., 216-220 E. Front St., Cincinnati 2, O.
Akron Metallic Gasket Co., 155 N. Union, P. O. Box 911, Akron 9, O.
Akwa Heaters, Inc., 1955 Park Ave., New York 35, N. Y.
Alabama Pipe Co., Anniston, Ala.
Aladdin Heating Corp., 2272 San Pablo Ave., Oakland 12, Calif.
Albertson & Co., Inc., Sioux City 3, Ia.
●Alco Valve Co., 861 Kingsland Ave., St. Louis 5, Mo.
●Aldrich Co., 105 Williams St., Wyoming, Ill.
Aldrich Pump Co., 4 Pine St., Allentown, Pa.
Alert Boiler & Mfg. Co., 9661 Robson, Detroit 27, Mich.
Alexander Bros., 406 N. 3rd, Philadelphia, Pa.
Alfol Div., Reflectal Corp., 155 E. 44th St., New York 17, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.
Allan Engineering Co., P. O. Box 1211, Dallas, Tex.
Allcraft Mfg. Co., 27 Hayward St., Cambridge, Mass.
●Allen-Bradley Co., 1335 S. First St., Milwaukee 4, Wis.
Allen Co., Inc., L. B., 6702 Bryn Mawr Ave., Chicago 31, Ill.
Allen Co., Robert G., P. O. Box 110, Mechanicsville, N. Y.
Allen Ventilator Div., Production Planning Co., 704 Woodward, Rochester, Mich.
Alliance Industries, Huntingden Valley, Pa.
Alliance Mfg. Co., Alliance, O.
Allied Control Co., Inc., 2 East End Ave., New York, N. Y.
Allied Weld-Craft, Inc., 401 W. South St., Indianapolis 25, Ind.
Allington & Curtis Mfg. Co., 1800 Holland Ave., Saginaw, Mich.
●Allis-Chalmers Mfg. Co., 1171 S. 70th St., Milwaukee 1, Wis.
Allis Co., Louis, The, 427 E. Stewart St., Milwaukee 7, Wis.
Alloy Steel Products Co., 1506 W. Elizabeth Ave., Linden, N. J.
Allpax Co., Inc., Mamaroneck, N. Y.
Alpha Metals, Inc., 363 Hudson Ave., Brooklyn 1, N. Y.
Alphil Spot Welding Co., 1058 Pacific St., Brooklyn, N. Y.
Alrose Chemical Co., Box 1294, Providence 1, R. I.
Alsoco Corp., 10 E. 52nd St., New York, N. Y.
●Alstrom Corp., 790 E. 176 St., Bronx 60, N. Y.
Altens Foundry & Machine Works, Inc., 226 W. Wheeling St., Lancaster, O.
Alton Mfg. Co., 1112 Ross Ave., Dallas 2, Tex.
Alton Mineral Wool Insulation Co., 2317 Whittemore Pl., St. Louis 4, Mo.
Aluminum Co. of America, Frick Bldg., Pittsburgh, Pa.
Amercoat Corp., 4809 Firestone Blvd., South Gate, Calif.
American Agile Corp., 5806 Hough Ave., Cleveland 3, O.
●American Air Filter Co., Inc., 373 Central Ave., Louisville 8, Ky.
●American Blower Corp., Detroit 32, Mich.
American Brass Co., 414 Meadow St., Waterbury 20, Conn.
American Car & Foundry Co., 30 Church St., New York 8, N. Y.
American Cast Iron Pipe Co., 2930 N. 16th St., Birmingham 2, Ala.
American Chemical Paint Co., Brookside Ave., Ambler, Pa.
American Cladmetals Co., P. O. Box 544, Carnegie, Pa.
American Coal Burner Co., 18 E. Erie St., Chicago 11, Ill.
American Coils Co., 360 Thomas St., Newark 5, N. J.
American Coolair Corp., 3604 Mayflower St., P. O. Box 2300, Jacksonville 3, Fla.
American Cooling Tower Co., 2710 McGee St., Kansas City 8, Mo.
American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y.
American Die & Tool Co., Inc., 3rd & Greenwich Sts., Reading, Pa.
American District Steam Co., 25 Bryant St., North Tonawanda, N. Y.
American District Telegraph Co., 155 Sixth Ave., New York, N. Y.
American Engineering Co., Aramingo Ave. and Cumberland St., Philadelphia 25, Pa.
American Felt Co., Glenville, Conn.
American Flange & Mfg. Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y.
American Flexible Coupling Co., 1801 Pittsburgh Ave., Erie, Pa.
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
American Furnace Co., 1300 Hampton Ave., St. Louis 10, Mo.
American Gas Accumulator Co., 1027 Newark Ave., Elizabeth 3, N. J.
●American Hair & Felt Co., 1828 Merchandise Mart, Chicago 54, Ill.
American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.
American Heat Corp., 491 Dutton St., Lowell, Mass.
American Hydrotherm Corp., 33-70 12th St., Long Island City 6, N. Y.
American Hydrovac, Div. Pitz Foundry Inc., 290 Scholes St., Brooklyn 6, N. Y.
American Implement Co., 2523 Taylor St., Omaha, Neb.

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American Injector Co., 14544 Third Ave., Detroit 13, Mich.
American Instrument Co., Silver Spring, Md.
American K. A. T. Corp., Garwood, N. J.
American Ladder & Scaffold Co., 5507 N. W. 7th Ave., Miami 38, Fla.
American-Larson Ventilation Co., 1004 Keystone Bank Bldg., Pittsburgh 22, Pa.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
American Locomotive Co., Diesel Engine Div., Auburn, N. Y.
American Machine Products Co., 401 S. Third Ave., Marshalltown, Ia.
American Machine Wks., Inc., Racine, Wis.
American Manganese Bronze Co., Rhawn & Hegerman Sts., Philadelphia, Pa.
American-Marietta Co., 101 E. Ontario St., Chicago 11, Ill.
American-Marsh Pumps, Inc., 60 Capital Ave., N. E., Battle Creek, Mich.
American Metal Hose Branch, American Brass Co., The, 698 S. Main St., Waterbury 20, Conn.
American Meter Co., Inc., 60 E. 42nd St., New York 17, N. Y.
American Moistening Co., 260 W. Exchange St., Providence, R. I.
American Nickeloid Co., 113 Second St., Peru, Ill.
American Photocopy Equipment Co., 2849 N. Clark St., Chicago 14.
American Pipe Bending Machine Co., Inc., 17 Furnace St., Poultney, Vt.
American Pipe Tool Co., 4856 W. Kinzie St., Chicago 44, Ill
American Platinum Wks., 231 New Jersey Railroad Ave., Newark, N. J.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29.
●American Radiator & Standard Sanitary Corp., P. O. Box 1226, Pittsburgh 30, Pa.
American-Sand Banum Co., Inc., 9 Rockefeller Plaza, New York 20, N. Y.
American Screw Co., Willimantic, Conn.
American Sheet Metal Works, 331 N. Alexander, New Orleans, La.
American Shipbuilding Co., Ft. W. 54th St., Cleveland 2, O.
American Solder & Flux Co., 2152 E. Norris St., Philadelphia 25, Pa.
American Steel Band Co., P. O. Box 565, Pittsburgh, Pa.
American Steel & Wire Co., United States Steel Corp. Subsidiary, Rockefeller Bldg., Cleveland 13, O.
American Stove Co., 1641 S. Kingshighway Blvd., St. Louis 10, Mo.
American Thermal Industries, Inc., 440 Illinois, Detroit 1, Mich.
American Ventilating Hose Co., 100 Park Ave., New York 17, N. Y.
American Warming & Ventilating Co., 1017-1021 Summit St., Toledo 4, O.
American Water Softener Co., Lehigh Ave. and 4th St., Philadelphia 33, Pa.
American Well Wks., 100 N. Broadway, Aurora, Ill.
American Wheelabrator & Equipment Corp., 619 S. Byrkit St., Mishawaka, Ind.
American Zinc Products Div., Ball Brothers Co., Greencastle, Ind.
Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Aminco Refrigeration Products Co., 14544 Third Ave., Detroit 3, Mich.
Ammco Tools, Inc., North Chicago, Ill.
Ammerman Co., C. L., 3719 3rd St., N. E., Minneapolis, Minn.
Amp Corp., 2921 Locust St., St. Louis, Mo.
Ampion Corp., 4-88 47th Ave., Long Island City 1, N. Y.
Analytical Measurements, Inc., 585 Main St., Chatham, N. J.
Anchor Packing Co., 401 N. Broad St., Philadelphia 8, Pa.
Andale Co., 1740 Cherry St., Philadelphia 3, Pa.
Andersen Corp., Bayport, Minn.
●Anderson Co., V. D., The, 1949 W. 96th St., Cleveland 2, O.
Anderson Diesel Engine Co., 6245 State Rd., Philadelphia 35, Pa.
Anderson Products, Inc., 17 Tudor St., Cambridge 39, Mass.
Anderson-Stolz Corp., 1731 Walnut St., Kansas City 8, Mo.
●Anemostat Corp. of America, 10 E. 39th St., New York 16, N. Y.
Anetsberger Bros., Inc., Northbrook, Ill.
Annis Air Filter Div., Royal Heaters, Inc., 1024 Westminster Ave., Alhambra, Calif.
Ansul Chemical Co., Refrigeration Div., Marinette, Wis.
Anti-Friction Bearings Co., 2020 S. Figueroa St., Los Angeles 7, Calif.
Apex All Weather Products, Engineering Div., 228 N. La Salle St., Chicago 1, Ill.
Apollo Steel Co., 609 Warren Ave., Apollo, Pa.
Appleman Glass Works, Bergenfield, N. J.
Applied Mechanics Co., 167 Oliver St., Boston 10, Mass.
●April Showers Co., Inc., 4126 Eighth St., N. W., Washington 11, D. C.
Aqua Electric Scale Control, Inc., 2028 E. 22nd St., Cleveland 15, O.
Aqua-Mist Co., 426 Jefferson St., Topeka, Kans.
Aqua-Sorb Co., 21 S. 16th St., East Orange, N. J.
Aquatrol Laboratories, Inc., 233 Randolph Ave., Clifton, N. J.
Arabol Mfg. Co., 110 E. 42nd St., New York 17, N. Y.
Arco Co., The, 7301 Bessemer Ave., Cleveland 27, O.
Arcos Corp., 1500 S. 50th St., Philadelphia 43, Pa.
Arcweld Mfg. Co., Inc., 3469 Third Ave., W., Seattle 99, Wash.
Arens Controls, Inc., 2017 Greenleaf St., Evanston, Ill.
Arex Co., 4317 Ravenswood Ave., Chicago 13, Ill.
Arjac Products Inc., 55-59 Halstead St., Rochester 10, N. Y.
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Armco Steel Corp., 703 Curtis St., Middletown, Ohio.
Armite Laboratories, 6609 Broad St., Los Angeles, Calif.
Armour and Co., Ammonia Div., 1355 W. 31st St., Chicago 9, Ill.
Armstrong Bros. Tool Co., 5200-5300 W. Armstrong Ave., Chicago 30, Ill.
Armstrong Co., The, 241 S. Post St., Detroit 17, Mich.
Armstrong Co., Richard M., Westchester, Pa.
●Armstrong Cork Co., 440 Concord St., Lancaster, Pa.
●Armstrong Machine Wks., 874 Maple St., Three Rivers, Mich.
Arrow-Hart & Hegeman Elect. Co., 103 Hawthorne St., Hartford 6, Conn.
Arrowhead Rubber Co., 11634 Patton Rd., Downey, Calif.
Art Valve Co., 4662 N. Lincoln Ave., Chicago 25, Ill.
Ashton Valve Co., 43 Kendrick St., Wrentham, Mass.
Askania Regulator Co., 240 E. Ontario St., Chicago 11, Ill.
Atkins & Co., E. C., 402 S. Illinois St., Indianapolis 9, Ind.
Atlantic Metal Hose Co., Inc., 123 W. 64th St., New York, N. Y.
●Atlantic Pipe Bending and Fabricating Corp., 552 River Rd., Edgewater, N. J.
Atlantic Steel Boiler Co., S. E. Cor. 22nd & Washington Ave., Philadelphia 46, Pa.
Atlantic Steel Co., P. O. Box 1714, Atlanta 1, Ga.
Atlas Chemical Co., Marietta, O.
●Atlas Mfg. Co., Eustis at Robbins St., St. Paul 4, Minn.
Atlas Powder Co., Industrial Finishes Dept., North Chicago, Ill.
Atlas Valve Co., 282 South St., Newark, N. J.
Atlas Welding Accessories Co., 707 E. Lewiston Ave., Ferndale 20, Mich.
Auburn Burner Co., Lock Box 269, Auburn, Ind.
Auburn Foundry Inc., Stoker Div., Auburn, Ind.
●Auer Register Co., 6600 Clement Ave., Cleveland 5, O.
●Aurora Pump Co., 619 Loucks St., Aurora, Ill.
Autempco Corp., 521 Fifth Ave., New York 17, N. Y.
Autoforce Ventilating System, 244 Washington St., Boston 8, Mass.
Automatic Control Co., 1005 University Ave., St. Paul 4, Minn.
Automatic Devices Co., Inc., 714 Hillgrove Ave., Western Springs, Ill.
Automatic Electric Mfg. Co., 10 State St., Mankato, Minn.
Automatic Firing Corp., 4417 Oleatha Ave., St. Louis 16, Mo.
Automatic Gas Equipment Co., 301 Brushton Ave., Pittsburgh 21, Pa.
Automatic Switch Co., 391 Lakeside Ave., Orange, N. J.
Automatic Temperature Control Co., Inc., 5212 Pulaski Ave., Philadelphia 44, Pa.
●Autorad Inc., 3535 Fillmore St., Chicago 24, Ill.
Autostributor Co., 226 Leslie St., Lansing 12, Mich.

B

B/W Controller Corp., 2200 E. Maple Ave., Birmingham, Mich.
Babbitt Chemical Specialties Co., 36 Prospect St., New Bedford, Mass.
Babbitt Steam Specialty Co., 1 Babbitt Sq., New Bedford, Mass.
●Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa.
Babcock & Wilcox Tube Co., The Welded Tube Div., Alliance, O.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh 8, Pa.
Bache & Co., Semon Greenwich & Morton Sts., New York 14, N. Y.
Badger Fire Extinguisher Co., 624 Somerville Ave., Somerville 43, Mass.
●Badger Mfg. Co., 230 Bent St., Cambridge 41, Mass.
Badham Insulation Co., Inc., Birmingham, Ala.
Baer Bros., 438 W. 37th St., New York 18, N. Y.
Bahnson Co., 1001 S. Marshall St., Winston-Salem, N. C.
Bailey Co., Chas. M., 667 Folsom St., San Francisco 7, Calif.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O.
Baker & Co., Inc., 113 Astor St., Newark 5, N. J.
Baker Refrigeration Corp., South Windham, Me.
●Baldor Electric Co., 4353 Duncan Ave., St. Louis 10, Mo.
Baldwin Belting, Inc., 74-76 Murray St., New York 7, N. Y.
Baldwin-Hill Co., 596 Breunig Ave., Trenton 2, N. J.
Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Ball Welding Works, Inc., 10154 Edes Ave., Oakland 3, Calif.
Balloffet Dies and Nozzle Co., Inc., 6825 Adams St., Guttenberg, N. J
●Baltimore Aircoil Co., Inc., 2615-2635 Mathews St., Baltimore 18, Md.
Baltimore Fan Co., Div. of Baltimore Aircoil Co., Inc., 2615-35 Mathews St., Baltimore 18, Md.
Baltimore Porcelain Steel Corp., P.O. Box 928, Baltimore 3, Md
Bar-Brook Mfg. Co., Inc., 6133 Linwood Ave., Shreveport, La.
Barber-Colman Co., 1228 Rock St., Rockford, Ill.
Barber Gas Burner Co., 3704 Superior Ave., Cleveland 14, O.
Barclay, Inc., Robert, 128 N. Peoria St., Chicago, Ill.
Barco Mfg. Co., 1801 Winnemac Ave., Chicago 40, Ill.
Bard Mfg. Co., Bryan, O.
Barksdale Valves, 4905 Santa Fe Ave., Los Angeles 58, Calif.
Barnes Co., A. D., 4731 Wilmington Pike, Dayton 9, O.
●Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston 36, Mass.
Barnes Manufacturing Co., Mansfield, O.
Barnes Tool Co., The, 152 Brewery St., New Haven 6, Conn.
Barreled Sunlight Paint Co., 43 Dudley St., Providence 1, R. I.
Barrett Div., The, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Barrett, Haentjens & Co., Hazleton, Pa.
Barrett Machine Co., 912-916 Behan St., N. S., Pittsburgh 12, Pa.
Bart Mfg. Co., Inc., 227 Main St., Belleville 9, N. J.
Barth Mfg. Co., Milldale, Conn.
Bartlett Hayward, Div. of Koppers Co., 200 Scott St., Baltimore, Md.
Bartlett Mfg. Co., 3003 E. Grand Blvd., Detroit 2, Mich.
Barton Co., 719 Hennepin, Minneapolis, Minn.
Barton Instrument Corp., 1429 S. Eastern Ave., Los Angeles 22, Calif.
Barton Products, Inc., Defiance, O.
Barwick Mfg. Corp., 317 E. 18th, Wichita, Kan.
Baseline Mfg. Corp., 4022 N. Washington Ave., Minneapolis 11, Minn.
Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, O.
Bastian-Morley Co., Inc., LaPorte, Ind.
Bath Co., Cyril, The, E. 70th and Machinery Ave., Cleveland 3, O.

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Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.
Bayer Co., 4030 Chouteau Ave.. St. Louis 10, Mo.
●Bayley Blower Co., 1817 S. 66th St., Milwaukee 14, Wis.
Beach-Russ Co., 64A Church St., New York, N. Y.
Beacon-Morris Corp., 60 Brainerd Rd., Allston, Boston 34. Mass.
Bear Mfg. Co., Industrial Div., Rock Island, Ill.
Bearings Co. of America, 501 Harrisburg Ave., Lancaster, Pa.
Bearlee Products Co., 1255 S. Monroe, Green Bay, Wis.
Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Beaver Art Metal Corp., Ellwood City, Pa.
Beaver Pipe Tools, Inc., 310 Dana Ave., Warren, O.
Beck Engineering Combustion Kompany, 2100 Cole St., St. Louis 6.
Beckett & Co., Inc., Thomas, 2001 Willowbrook Rd., P. O. Box 7354, Dallas 9, Tex.
Beckley Perforating Co., 301 North Ave., Garwood, N. J.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., 435 N Broad St., Philadelphia 23, Pa.
Belknap Mfg. Co., 800 Union Ave., Bridgeport 1, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Bellows Co., 222 W. Market St., Akron 9, O.
Belmont Packing & Rubber Co., The, Butler & Sepviva Sts., Philadelphia 37, Pa.
Belmont Smelting & Refining Wks., Inc., 349 Belmont Ave., Brooklyn 7, N. Y.
Belter Electric Mfg. Co., G. J., The, 3830-32 Olive St., St. Louis 8.
Benjamin Air Rifle Co., 1527 S. 8th St., St. Louis 4, Mo.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Bennett Oil Co., 964 S. Saddle Creek Rd., Omaha 6, Neb.
Benson Co., Inc., Alex R., 1040 Bay Rd., So., Hudson, N. Y.
Bergen Genspring Corp., 50 Church St., New York 7, N. Y.
Berger Bros. Co., 229-237 Arch St., Philadelphia 6, Pa.
Berger Mfg. Div., Republic Steel Corp., 1038 Belden Ave., Canton 5, O.
Berns Mfg. Corp., 3050 N. Rockwell St., Chicago, Ill.
Bernz Co., Otto, 280 Lyell Ave., Rochester 6, N. Y.
Bertsch & Co., Inc., Church St., Cambridge City, Ind.
●Best Combustion Equipment Co., Inc., W. N., 415 11th St., Carlstadt. N. J.
Best Register Co., 2005 W. Oklahoma Ave., Milwaukee 15, Wis.
Bete Fog Nozzle Inc., 85 Pierce St., Greenfield, Mass.
Bethlehem Steel Co., Bethlehem, Pa.
Betz Corp., 460 State St., Hammond, Ind.
Beverly Shear Mfg. Co., 3013 W. 110th Pl., Chicago 43, Ill.
Biersach & Niedermeyer Co., 1937 N. Hubbard St., Milwaukee 12.
Bigelow Co., The, 174 River St., New Haven 3, Conn.
Bigelow Liptak Corp., 2842 W. Grand Blvd., Detroit 2, Mich.
Biggs Boiler Wks. Co., The, 1007 Bank St., E. Akron 5, O.
Bignall & Keeler Div., John Ramming Machine Co., 4591 McRee Ave., St. Louis 10, Mo.
Billings & Spencer Co., 1 Laurel St., Hartford 1, Conn.
●Binks Mfg. Co., 3114-40 Carroll Ave., Chicago 12, Ill.
Birchfield Boiler, Inc., 2503 E. 11th St., Tacoma 1, Wash.
Bird-Archer Co., 4337 North American St., Philadelphia 40, Pa.
Birdsell Mfg. Co., Inc., 750 San Antonio Rd., Palo Alto, Calif.
●Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland 14, O.
●Bituminous Coal Institute, Southern Bldg., Washington 5, D. C.
Black & Decker Mfg. Co., 628 Pennsylvania Ave., Towson 4, Md.
Black Magic Products Co., P. O. Box 1703, Tulsa, Okla.
Black Mfg. Co., The, 100 Dairy Rd., Parkton, Md.
Black-Sivalls & Bryson, Inc., 7501 E. 10th St., Kansas City 3, Mo.
Blackhawk Mfg. Co., 5325 W. Rogers St., Milwaukee 1, Wis.
Blackmer Pump Co., 1920A Century Ave., S. W., Grand Rapids 9.
Blaisdell Compressor Co., 227 Fulton St., New York, N. Y.
Blazer, M., & Son, 173 Market St., Passaic, N. J.
Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, O.
Blokolgas System, Inc., 70 W. Alexandrine, Detroit 1, Mich.
Blood Brothers Machine Co., Div. of Standard Steel Spring Co., Allegan, Mich.
Blower Application Co., 3165 N. 30th St., Milwaukee 16, Wis.
Blue Ridge Talc Co., Inc., Henry, Va.
Blue Seal Chemical Co., 177 Westfield Ave., W., Roselle Park, N. J.
Bodine Electric Co., 2254 W. Ohio St., Chicago 12, Ill.
Bogue Electric Co., 37 Kentucky Ave., Paterson 3, N. J.
Bohn Aluminum & Brass Corp., 2306 Franklin St., Detroit, Mich.
●Boiler Engineering & Supply Co., Manavon Rd., Phoenixville, Pa.
Bonafide Genasco, Inc., 295 Fifth Ave., New York 16, N. Y.
●Bonney Forge & Tool Wks., 350 Green St., Allentown, Pa.
Bordo Co., Inc., L. J., 115 New St., Glenside, Pa.
Borg-Erickson Corp., 469 E. Ohio St., Chicago 11, Ill.
Borm Mfg. Co., 23 N. Union St., Elgin, Ill.
Boston Auto Gage Co., 70 West St., Pittsfield, Mass.
Boston Gear Works, Inc., North Quincy, Mass.
Boston Woven Hose & Rubber Co., 29 Hampshire St., Cambridge, Mass.
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia 47, Pa.
Bowen Engineering, Inc., North Branch, N. J.
Bowerston Shale Co., Bowerston, O.
Bowser, Inc., 1302 E. Creighton Ave., Fort Wayne 2, Ind.
Boyle-Midway Inc., Correctair Div., 22 E. 40th St., New York 16.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Brabender Corp., Rochelle Park, N. J.
Bradfield, Jos. L., 10 N. Senate Ave., Indianapolis, Ind.
Brady Co., W. H., 16 E. Spring St., Chippewa Falls, Wis.
Brandt & Co., Inc., Eugene J., 847 11th Ave., New York 19, N. Y.
●Breidert Co., G. C., 3129 San Fernando Rd., Los Angeles 65, Calif.
Bremil Mfg. Co., 1204 Pittsburgh Ave., Erie, Pa.
Bridgeport Brass Co., 30 Grand St., Bridgeport 2, Conn.
Bridgeport Thermostat Div., Robertshaw-Fulton Controls Co., Connecticut Ave., Bridgeport 1, Conn.
Bristol Co., The, P. O. Box 1790, Waterbury 20, Conn.
Broan Mfg. Co., Inc., 1669 N. Water St., Milwaukee 2, Wis.
Brockway Co., 361 Church St., Naugatuck, Conn.
Bronson Fan Mfg. Co., 1237 Riverside Dr., Los Angeles 31, Calif.
Bronze Bearings, Inc., 856 North Ave. East, Cranford, N. J.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia 44, Pa.
Brookfield Engineering Laboratories, Inc., 2 Porter St., Stoughton, Mass.
Brooklyn Varnish Mfg. Co., 50 Jay St., Brooklyn 1, N. Y.
Brooks Equipment Corp., 217 Hudson St., Hoboken, N. J.
Bros Boiler & Mfg. Co., Wm., 1057 10th Ave., S. E., Minneapolis 14.
Brown-Brockmeyer Co., Inc., P. O. Box 989, Dayton 1, O.
Brown Co., 150 Causeway St., Boston, Mass.
Brown-Electro Co., 17 N. Dewey, Oklahoma City 2, Okla.
Brown Fintube Co., The, Elyria, O.
Brown Products Co., 97-12 Metropolitan Ave., Forest Hills, N. Y.
Browning Mfg. Co., Inc., 1940 Browning Blvd., Maysville, Ky.
Bruen and Sons, Robert, 874 412 St., Oakland, Calif.
Brundage Co., The, 503 N. Park St., Kalamazoo 11, Mich.
Bruning Co., Inc., Charles, 4700 Montrose Ave., Chicago 41, Ill.
●Brunner Mfg. Co., 1821 Broad St., Utica 1, N. Y.
Bryan Steam Corp., P. O. Box 337, Peru, Ind.
Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland 3, O.
Bryant Heater Div., Affiliated Gas Equipment Co., Inc., 17825 St. Clair Ave., Cleveland 10, O.
Bubar, Dust Systems, Inc., Old Lyme, Conn.
Buckeye Furnace Pipe Co., Columbus 8, O.
Buckeye Tools Corp., 29 W. Apple St., Dayton 1, O.
Buda Co., Harvey, Ill.
Buensod-Stacey, Inc., 60 E. 42nd St., New York 17, N. Y.
Buffalo Bolt Co., North Tonawanda, N. Y.
●Buffalo Forge Co., 171 Mortimer St., Buffalo 5, N. Y.
Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y.
●Buffalo Pumps, Inc., 171 Mortimer St., Buffalo 5, N. Y.
Buffalo Tank Corp., 744 Broad St., Newark 2, N. J.
Buflovac Equipment Div. of Blaw-Knox Co., 50 Winchester Ave., Buffalo 11, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, 345 Harris Ave., Providence 1, R. I.
●Bullard Co., The, Bridgeport 2, Conn.
Bump Pump Co., La Crosse, Wis.
●Bundy Tubing Co., 8109 E. Jefferson Ave., Detroit 14, Mich.
Burden Co., Alan E., 6525 Sunset Blvd., Hollywood 28, Calif.
Burdette Mfg. Co., 3433 W. Madison St., Chicago 24, Ill.
Burgess-Manning Co., Architectural Products Div., 5970 Northwest Highway, Chicago 31, Ill.
Burke Electric Co., Div. of Marathon Electric Mfg. Corp., 1201 W. 12th St., Erie, Pa.
Burling Instrument Co., Air Conditioning Div., 5 Vose Ave., South Orange, N. J.
Burnham Corp., Boiler Div., Main St., Irvington, N. Y.
Burnley Battery & Mfg. Co., 103 Clay St., North East, Pa.
Burrows Mfg. Co., F. A., 318 E. Poplar St., York, Pa.
Burt Mfg. Co., 41 E. South St., Akron 11, O.
Bury Compressor Co., 18th & Cascade Sts., Erie, Pa.
●Bush Mfg. Co., 179 South St., West Hartford 10, Conn.
Byers Co., A. M., Clark Bldg., Pittsburgh 22, Pa.

C

CCA Products, Inc., P. O. Box 671, Glendale 5, Calif.
C & H Air Conditioning Fan Co., Inc., 1603 DeKalb Ave., N. E., Atlanta 6, Ga.
Cabot, Inc., Samuel, 141 Milk St., Boston 9, Mass.
Calbar Paint & Varnish Co., 2612-26 N. Martha St., Philadelphia 25.
●Calculator Specialties Co., 122 S. Michigan Ave., Chicago 3, Ill.
Caldwell Co., W. E., 2120 Brook St., Louisville, Ky.
Calgon, Inc., Hagan Bldg., Pittsburgh 30, Pa.
California Brass Mfg. Co., 1447 Naud St., Los Angeles 12, Calif.
Callahan Can Machine Co., Inc., 80 Richard St., Brooklyn, N. Y.
Caloroil Burner Corp., 850 Windsor St., Hartford 5, Conn.
Cambridge Corp., 350 S. Geddes St., Syracuse, N. Y.
Camco Products Inc., 25 Fox St., New Haven 13, Conn.
Camloc Fastener Corp., 420 Lexington Ave., New York 17, N. Y.
Campbell Co., J. A., 645 E. Wardlaw Rd., Long Beach 7, Calif.
Campbell Engineering Co., 918 N. Union St., Appleton, Wis.
●Campbell Heating Co., P.O. Box 833, Des Moines 4, Ia.
Campbell Heating Co., E. K., 1809 Manchester, Kansas City 3, Mo.
Cam-Stat, Inc., Div. of The Paul Henry Co., 11833 West Olympic Blvd., Los Angeles 64, Calif.
Canatsey Electric Mfg. Co., Box 556, Kansas City 8, Mo.
Cannelton Sewer Pipe Co., RadianTile Div., 120 S. LaSalle St., Chicago 3, Ill.
Cannon Chemical Co., Inc., 181 Portland St., Cambridge 41, Mass.
Canton Stoker Corp., 407 Andrew Place, S. W., Canton 1, O.
Canvas Products Co., 1236 S. 7th St., St. Louis 4, Mo.
Capewell Mfg. Co., Hartford 2, Conn.
Capitol Mfg. & Supply Co., 153 W. Fulton St., Columbus, O.
Carbide and Carbon Chemicals Co., A Div. of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Cardox Corp., 307 N. Michigan Ave., Chicago, Ill.
Carey Electronic Engineering Co., Metal Wool Div., 1880 Clifton Ave., Springfield, O.
●Carey Mfg. Co., Philip, Wayne Ave., Lockland, Cincinnati 15, O.

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Cargocaire Engineering Corp., 15 Park Row, New York 38, N. Y.
Carling Turbine Blower Co., 25 St. John's Rd., Worcester 3, Mass.
Carlson & Sullivan, 1714 California St., Monrovia, Calif.
Carnes, Inc., John R., Greenlawn Ave. & Erie R. R., Lima, O.
Carney Co., Inc., The, Mankato, Minn.
Carolina Aniline & Extract Co., 301 S. Cedar St., Charlotte, N. C.
Carolina Blower Co., Inc., 430 Morehead Ave., Greensboro, N. C.
Carpenter Heating & Stoker Co., 2135 St. Clair Ave., Cleveland 14, O.
Carpenter Mfg. Corp., The, 9523 Detroit Ave., Cleveland 2, O.
Carpenter & Paterson, Inc., 1190 Bennington St., East Boston 2, Mass.
Carpenter Steel Co., Alloy Tube Div., Union, N. J.
●Carrier Corp., 302 S. Geddes St., Syracuse 1, N. Y.
Carty & Moore Engineering Co., 1150 W. Baltimore Ave., Detroit 26, Mich.
Carver Pump Co., Muscatine, Ia.
Case & Son Mfg. Co., W. A., 33 Main St., Buffalo 3, N. Y.
●Cash Co., A. W., P. O. Box 551, Decatur, Ill.
Cash Valve Mfg. Co., A. W., 6621 E. Wabash Ave., Decatur 80, Ill.
Cashin Co., W. D., 69 A. St., Boston 27, Mass.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Caterpillar Tractor Co., Peoria 8, Ill.
Catskill Metal Works, Inc., Catskill, N. Y.
Cee-Kleer Products Co., 947 W. 6th St., Cincinnati 3, O.
Celco Corp., 110 E. 42nd St., New York 17, N. Y.
Celotex Corp., The, 120 S. La Salle St., Chicago 3, Ill.
Cement Lined Pipe Co., 93 Brookline St., Lynn, Mass.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland 4, O.
Central Die Casting & Mfg. Co., Inc., 2935 W. 47th St., Chicago, Ill.
Central Foundry Co., Murray & Pacific Sts., Newark 5, N. J.
Central Rubber & Steel Corp., P. O. Box 420, Findlay, O.
Central States Mfg. Co., Inc., 1200-12 Summit St., Arkansas City, Kan.
Central States Steel Boiler Co., 4649 W. Harrison St., Chicago 44, Ill.
Central Station Steam Co., 2920 E. Woodbridge St., Detroit 7, Mich.
Central Wire & Iron Works, 621 E. Locust St., Des Moines, Ia.
Centrifix Corp., 3029 Prospect Ave., Cleveland 15, O.
Centri-Spray Corp., 14290 Meyers Rd., Detroit 27, Mich.
Century Aircraft Co., 5607 W. Century Blvd., Los Angeles 45, Calif.
●Century Electric Co., 1806 Pine St., St. Louis 3, Mo.
Century Engineering Corp., 401-431 3rd St., S. E., Cedar Rapids, Ia.
Century Fan & Ventilator Co., 41 Cedar St., Stamford, Conn.
Certain-teed Products Corp., 120 E. Lancaster Ave., Ardmore, Pa.
Certified Flexible Couplings, 369 Lexington Ave., New York 17, N. Y.
Certified Furnace Co., Div. Stainless & Steel Products Co., 1000 Berry Ave., St. Paul 4, Minn.
Chace Co., W. M., 1606 Beard Ave., Detroit 9, Mich.
Chain Belt Co., 1617 W. Bruce, Milwaukee 4, Wis.
Chamberlin Co. of America, 1254 La Brosse St., Detroit 32, Mich.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa.
Champion Furnace Pipe Co., 215 Eaton St., Peoria 3, Ill.
Champion Laboratories, Inc., Meriden, Conn.
Champion Machine & Forging Co., 3695 E. 78th St., Cleveland 5, O.
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia.
Chaplin-Fulton Mfg. Co., 5800 Grand Ave., Pittsburgh 25, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Char-Gale Mfg. Co., 4325 Hiawatha Ave., Minneapolis 6, Minn.
●Chase Brass & Copper Co., 236 Grand St., Waterbury 20, Conn.
Chase-Shawmut Co., Newburyport, Mass.
Chelsea Fan & Blower Co., Inc., 639 South Ave., Plainfield, N. J.
Chelsea Metal Stamping Co., 95 8th Ave., New York 11, N. Y.
Chemalloy Associates, Santee, Calif.
Chemical Engineering Co., 2800 Logan St., P. O. Box 1076, Dallas 1.
Chemical Solvent Co., 3005 N. 16th St., Birmingham, Ala.
Chemical & Metallurgical Products, Inc., 74 Washington St., New York, N. Y.
Cheney Flashing Co., 623 Prospect St., Trenton 5, N. J.
●Chester Cable Corp., Chester, N. Y.
Chesterton Co., A. W., 6 Ashland St., Everett 49, Mass.
Chicago Belting Co., 113-125 N. Green St., Chicago 7, Ill.
●Chicago Blower Corp., 4558 W. Congress St., Chicago 24, Ill.
Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill.
Chicago Die Casting Mfg. Co., 2510-14 W. Monroe St., Chicago 12, Ill.
Chicago Expansion Bolt Co., 1338 W. Concord Pl., Chicago 22, Ill.
Chicago Fan & Fin Coil Co., 1937 Walnut St., Chicago 12, Ill.
Chicago Fire Brick Co., 1467 N. Elston Ave., Chicago 22, Ill.
Chicago Float Works, Inc., Dept. T., 2330 S. Western Ave., Chicago 8, Ill.
Chicago Furnace Supply Co., 1278 Clybourn Ave., Chicago, Ill.
Chicago Gasket Co., 1275 West North Ave., Chicago 22, Ill.
Chicago Metal Hose Corp., 1315 S. Third Ave., Maywood, Ill.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago 32, Ill.
Chicago Nipple Mfg. Co., 1616 S. Laramie Ave., Cicero 50, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
●Chicago Pump Co., 2300 Wolfram St., Chicago 18, Ill.
Chicago Specialty Mfg. Co., 2954 Lawrence Ave., Chicago 25, Ill.
Chicago Steel Furnace Co., 9326 S. Anthony Ave., Chicago 17, Ill.
Chicago Steel Tank Co., 6400 W. 66th, Chicago 38, Ill.
Chicago-Wilcox Mfg. Co., E. 77th St. and Anthony Ave., Chicago, Ill.
Chiksan Co., Brea, Calif.
Childers Mfg. Co., 625 Yale St., Houston 7, Tex.
Chrysler Airtemp, Div. of Chrysler Corp., 1600 Webster St., Dayton 1, O.
Churchward Welding Accessories, Jack, North Haven, Conn.
Cincinnati Electrical Tool Co., The, 2684 Madison Rd., Cincinnati 8, O.
Cincinnati Metalcrafts Inc., 5000 Brotherton Rd., Cincinnati 9, O.
Cincinnati Shaper Co., Hopple, Garrard and Elam, Cincinnati 25, O.
Cinder Products Corp., 75 Ellenfield St., Providence, R. I.
Circulators & Devices Mfg. Corp., 128-168 Thirty-Second St., Brooklyn 32, N. Y.
Cissell Mfg. Co., Inc., W. M., 831 S. First St., P. O. Box 1143, Louisville 1, Ky.
●Clarage Fan Co., Porter St., Kalamazoo 16, Mich.
Clark Bros. Bolt Co., Milldale, Conn.
Clark Bros. Mfg. Co., Hillsboro, Ore.
Clark Controller Co., 1146 E. 152nd St., Cleveland 10, O.
Clark Dust Control Co., 210 N. Mozart St., Chicago, Ill.
Clark Electric Co., Jas., Jr., 615 Bergman St., Louisville 3, Ky.
Clark Mfg. Co., 1830 E. 38th St., Cleveland 14, O.
Claronex Products, Inc., 239 Java St., Brooklyn, N. Y.
Cla-Val Co., P. O. Box 949, Alhambra, Calif.
Clay Equipment Corp., Cedar Falls, Ia.
Clayton & Lambert Mfg. Co., 1701 Dixie Hwy., Louisville 10, Ky.
●Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wis.
Cleveland Brass Mfg. Co., The, 4606 Hamilton Ave., Cleveland, O.
Cleveland Fuel Equipment Co., 7316 Associate Ave., Cleveland 9, O.
Cleveland Graphite Bronze Co., 17000 St. Clair Ave., Cleveland 10, O.
Cleveland Humidifier Co., 7802 Wade Park Ave., Cleveland 3, O.
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland 14, O.
Cleveland Crane & Eng. Co., Steelweld Div., 5866 E. 289th St., Wickliffe, O.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., 152 Grove St., Waltham 54, Mass.
●Climatemaker Heat Loss Calculator Co., Box 378, Bloomington, Ill.
Climax Machinery Co., 301 S. LaSalle St., Indianapolis, Ind.
Climax Metal Products Co., 863 E. 140 St., Cleveland 10, O.
Clinton Metallic Paint Co., P. O. Box 278, Clinton, N. Y.
Clizbe Bros. Mfg. Co., Plymouth, Ind.
Clow & Sons, James B., 201-299 N. Talman Ave., Chicago 12, Ill.
Cobra Pipe & Coil Co., Inc., Brook St., P. O. Box 176, Elmwood 10, Conn.
Cochrane Corp., 3131 N. 17th St., Philadelphia 32, Pa.
Coe Mfg. Co., Bank St., Painesville, O.
Coffin Co., J. S., Jr., 326 S. Dean St., Englewood, N. J.
Cole-Sewell Engineering Co., 2288 University Ave., St. Paul 4, Minn.
Colebrook & Sons, Inc., W. H. 246 Walton St., Syracuse, N. Y.
Coleman-Pettersen Corp., 2130 St. Clair Ave., Cleveland 14, O.
Colonial Alloys Co., Metals Div., Ridge Ave. and Crawford St., Philadelphia 29, Pa.
Columbia Engineering Service Co., 173 14th St., San Francisco 3, Calif.
Columbia Steel Co. (Sub. United States Steel Corp.), Russ Bldg., 235 Montgomery St., San Francisco 6, Calif.
Columbian Steel Tank Co., 1509 W. 12th St., Kansas City 7, Mo.
Columbus Heating & Ventilating Co., 182 N. Yale Ave., Columbus 16, O.
Columbus Steam Pump Wks. Co., 724 W. Gay St., Columbus 8, O.
Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.
Combustion Engineering-Superheater, Inc., 200 Madison Ave., New York 16, N. Y.
Comfort Products Corp., 2220 Lamesa, Dallas 2, Tex.
Commercial Filters Corp., 18 W. Third, Boston 27, Mass.
Commercial Plastics Co., 1198 Merchandise Mart, Chicago 54, Ill.
Commercial Shearing & Stamping Co., 1775 Logan, P. O. Box 719, Youngstown 1, O.
Commercialaire, Inc., 300 Pacific St., Brooklyn 2, N. Y.
●Committee on Steel Pipe Research, American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.
Commonwealth Brass Corp., 5781-5835 Commonwealth Ave., Detroit 8, Mich.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Condensation Engineering Corp., 3511 W. Potomac Ave., Chicago 51, Ill.
●Condenser Service & Engineering Co., Inc., 95 River St., Hoboken, N. J.
Conditionaire Unit Co., 2821 Montrose Ave., Chicago 18, Ill.
Congress Drives Div., Tann Corp., 3750 E. Outer Drive, Detroit 34, Mich.
Congress Fan & Electric Co., P. O. Box 3747, Peninsula Sta., Daytona Beach, Fla.
Conneaut Plastic Metallic Packing Co., Conneaut, O.
Connery Construction Co., 2nd and Luzerne Sts., Philadelphia 40, Pa
●Connor Engineering Corp., W. B., Danbury, Conn.
Conoflow Corp., Dept. P, 2100 Arch St., Philadelphia 3, Pa.
Consolidated Boiler Corp., 126 Dartmouth St., Boston 16, Mass.
Consolidated Car-Heating Co., Inc., Albany. N. Y.
●Continental Air Filters, Inc., 2520 Helm St., Louisville 1, Ky.
Continental Boiler Co., Manavon Rd., Phoenixville, Pa.
Continental-Diamond Fibre Co., Newark, Del.
Continental Electric Co., Inc., 323 Ferry St., Newark, N. J.
Continental Machine Co., 1952-54 Maud Ave., Chicago 14, Ill.
Continental Motors Corp., Muskegon 82, Mich.
Continental Products Co., 1150 E. 222nd St., Euclid 17, O.
Continental Rubber Wks., 2000 Liberty St., Erie, Pa.
Continental Screw Co., Mt. Pleasant St., New Bedford, Mass.
Continental Steel Corp., 1108 S. Main St., Kokomo, Ind.
Contractor's Engineering Co., 600 W. 58th St., New York, N. Y.
Controlair Mfg. Co., 1932 S. Compton Ave., Los Angeles, Calif.
Cook, Inc., A. D., Lawrenceburg, Ind.
Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.
Cooper Alloy Foundry Co., The, Bloy St. & Ramsey Ave., Hillside, N. J.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Cooper Co., Clark, Palmyra, N. J.
Copeland Refrigeration Corp., Sidney, O.
Coppus Engineering Corp., 344 Park Ave., Worcester 2, Mass.
Coral Designs, 12-16 Astoria Blvd., Long Island City 2, N. Y.
Corbman Bros., Inc., 315 N. 7th St., Philadelphia 6, Pa.
Cordo Chemical Co., 34 Smith St., Norwalk, Conn.

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Cork Import Corp., 1 Engle St., Englewood, N. J.
Cork Insulation Co., Inc., 730-5th Ave., New York, N. Y.
Corley Co., Inc., The, One Exchange Place, Jersey City 2, N. J.
Corning Glass Works, Corning, N. Y.
Coroaire Heater Corp., The, 1124 Hanna Bldg., Cleveland 15, O.
●C-O Two Fire Equipment Co., Newark, N. J.
Coughlan Co., G. N., West Orange, N. J.
Couplings Co., 55 E. 18th St., Chicago 16, Ill.
Cox Mfg. Co., Ridgeville, Ind.
Crabb Engineering Co., 13594 Wisconsin Ave., Detroit 4, Mich.
●Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.
Crane Packing Co., 1872 Cuyler Ave., Chicago 13, Ill.
CraneVeyor Corp., 1240 S. Boyle Ave., Los Angeles 23, Calif.
Crawford Co., 3220 W. 31st St., Chicago 23, Ill.
Crescent Tool Co., 230 Harrison St., Jamestown, N. Y.
Crittall Radiant Heating, Inc., Richard, 665 Fifth Ave., New York 22, N. Y.
Crocker-Wheeler Div. Elliott Co., Ampere, N. J.
Croll-Reynolds Engineering Co., Inc., 17 Johns St., New York 7, N. Y.
Croll & Son, Jesse G., 2326-2606 Germantown Ave., Philadelphia, Pa.
Crosby Steam Gage & Valve Co., 43 Kendrick St., Wrentham, Mass.
Crotty Mfg. Corp., 133-15 35th Ave., Flushing, L. I., N. Y.
Crowell & Dunn, Inc., 225 Lafayette St., New York, N. Y.
Crown Controls Co., Inc., 124 S. Washington St., New Bremen, O.
Crown Die & Tool Co., 108 N. Jefferson St., Chicago 6, Ill.
Crown Iron Works Co., 1202 N. E. Tyler, Minneapolis, Minn.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Cryer Trap & Valve Co., Inc., 366 Madison Ave., New York 17.
Culligan Soft Water Institute, Northbrook, Ill.
Cuno Engineering Corp., 80 S. Vine St., Meriden, Conn.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., 1950 Kienlen Ave., St. Louis 20, Mo.
Custom Engineering Co., 3138 W. Slauson Ave., Los Angeles 43, Calif.
Cutler-Hammer, Inc., 421 N. 12th St., Milwaukee 1, Wis.
Cyclotherm Corp., 157 E. First St., Oswego, N. Y.

D

Daffin Mfg. Co., Lancaster, Pa.
Dahlquist Mfg. Co., Inc., Div. of Process Engineering Inc., 628 Somerville Ave., Somerville 43, Mass.
Daigger & Co., A., 161 W. Kinzie St., Chicago, Ill.
Dalmo-Victor Co., San Carlos, Calif.
Daly, Merritt & Sullivan, Inc., West Broad St., Falls Church, Va.
Dalzen Mfg. Co., 525 South Riverside, St. Clair, Mich.
Dampney Co., The, 1243 River St., Hyde Park, Boston 36, Mass.
Dana Fan & Blower Corp., 3501-27 Colerain Ave., Cincinnati 23, Ohio.
Danzer Metal Works Co., Box 201, Hagerstown, Md.
Darcoid Co., Inc., 145 Sixth Ave., New York 13, N. Y.
Darling Valve & Mfg. Co., 701 First St., Williamsport, Pa.
Dart Union Co., E. M., 134 Thurbers Ave., Providence 5, R. I.
DAS Div. of, Defiance Automatic Screw Co., Defiance, O.
Davey Compressor Co., Kent, O.
Davidson Co., M. T., 7 Dey St., New York 7, N. Y.
Davidson Hyduty Roof Fan Co., 213 California St., Newton, Mass.
Davies & Co., Wayne, Westboro, Mass.
Davis & Co., Dean W., 3418 Milwaukee Ave., Chicago 41, Ill.
Davis Engineering Corp., 1070 E. Grand St., Elizabeth 4, N. J.
Davis Instruments, Div. of Davis Emergency Equipment Co., Inc., 201 Halleck St., Newark 4, N. J.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago 8, Ill.
Day & Night Div., Affiliated Gas Equipment, Inc., 700 Royal Oaks Dr., Monrovia, Calif.
Day Co., The, 810-830 Third Ave., N. E., Minneapolis 13, Minn.
Dayton Air Compressor Co., The, 427 Valley St., Dayton 4, O.
Dayton Rubber Co., 2342 W. Riverview Ave., Dayton 1, O.
Dean Brothers Pumps, Inc., 323 W. 10th St., Indianapolis 7, Ind.
Dean Hill Pump Co., 4000 E. 16th St., Indianapolis 7, Ind.
Dearborn Chemical Co., Merchandise Mart Plaza, Chicago 54, Ill.
Debevoise Co., The, 74-84 20th St., Brooklyn 32, N. Y.
●DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Decatur Iron & Steel Co., P. O. Box 72, Decatur, Ala.
Decatur Pump Co., 2750 Nelson Park Dr., Decatur 70, Ill.
Deepfreeze Distributing Corp., Sub Zero Products Mfg. Div., 3928 Reading Rd., Cincinnati 29, O.
Defender Instrument & Regulator Co., 815 Clark Ave., St. Louis 2, Mo.
Diesel Oil Burner Corp. of New York, 105-20 New York Blvd., Jamaica, Long Island, N. Y.
●De Laval Steam Turbine Co., Trenton 2, N. J.
●Delavan Mfg. Co., 3007-Sixth Ave., Des Moines 13, Ia.
Delco Appliance Div., General Motors Corp., P. O. Box 230, Rochester 1, N. Y.
Delco Products Div., General Motors Corp., 329 E. First St., Dayton 1, O.
Delta-Star Electric Co., Div. of H. K. Porter Co., Inc., 2437 Fulton St., Chicago 12, Ill.
Deming Co., 14 Aetna St., Salem, O.
Demuth & Sons, Charles, 245 Elm Place, Mineola, L. I., N. Y.
Dersch, Gesswein & Neuert, Inc., 4849 W. Grand Ave., Chicago 39, Ill.
Desmond-Stephan Mfg. Co., Urbana, O.
Desolvo Co., The, 719 Foreland St., Pittsburgh 12, Pa.
d'Este Div., Kaye & MacDonald, Inc., 11-15 Central Ave., West Orange, N. J.
De-Tec-Tronic Laboratories, Inc., 1227 N. Clark St., Chicago 10, Ill.
Detroit Brass & Malleable Works, 100 S. Campbell, Detroit 9, Mich.
Detroit Diesel Engine Div., General Motors Corp., 13400 W. Outer Dr., Detroit 23, Mich.
Detroit Lubricating Co., 5900 Trumbull Ave., Detroit 8, Mich.
Detroit Stamping Co., 350 Midland Ave., Detroit 3, Mich.
●Detroit Stoker Co., Fifth Floor, General Motors Bldg., Detroit 2, Mich.
Devices, Inc., 214 E. 53 St., New York 22, N. Y.
DeVilbiss Co., The, 300 Phillips Ave., Toledo 1, O.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., 1932 Oliver Bldg., Pittsburgh 22, Pa.
Devoe & Raynolds Co., Inc., 44th St. and 1st Ave., New York 17, N. Y.
Dewey-Shepard Boiler Co., 1311 N. Capitol Ave., Indianapolis, Ind.
De Zurik Shower Co., Sartell, Minn.
Dial Light Co. of America, Inc., 900 Broadway, New York 3, N. Y.
Diamond Chain Co., Inc., 438 Kentucky Ave., Indianapolis 7, Ind.
Diamond Chemical Products, 17 E. 48th St., New York, N. Y.
Diamond Expansion Bolt Co., Inc., 500 North Ave., Garwood, N. J.
Diamond Iron Works, Inc., 1728 Second St. N., Minneapolis 11, Minn.
Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Calif.
Diamond Mfg. Co., 253 W. Eighth St., Wyoming, Pa.
Diamond Power Specialty Corp., P. O. Box 415, Lancaster, O.
Diceler Div. of General Machine & Mfg. Co., Blair St. and Spring Garden Ave., Berwick, Pa.
Dick Co., Inc., R. & J., 24-48 Sade St., Passaic, N. J.
Dickinson, Aeolus, 3320 S. Artesian Ave., Chicago, Ill.
Diehl Mfg Co., Finderne Plant, 1106 Finderne Ave., Somerville, N. J.
Dietzgen Co., Eugene, 2425 Sheffield Ave., Chicago 14, Ill.
Dillon Co., Inc., W. C., 1421 S. Circle Ave., Forest Park, Ill.
Dillon Steam Boiler Wks., Inc., D. M., Crocker St., Fitchburg, Mass.
Division Lead Co., 836 W. Kinzie St., Chicago 22, Ill.
Dixon Crucible Co., Joseph, Wayne & Monmouth Sts., Jersey City 3, N. J.
Doall Co., The, 254 N. Laurel Ave., Des Plaines, Ill.
Dockson Corp., 3839 Wabash Ave., Detroit 8, Mich.
Dockstader, Inc., S. E., 1128 Munsey Bldg., Washington 4, D. C.
●Dodge Mfg. Corp., 500 S. Union St., Mishawaka, Ind.
●Dole Refrigerating Co., 5910 N. Pulaski, Chicago 30, Ill.
●Dole Valve Co., The, 1933 Carroll Ave., Chicago 12, Ill.
Dollinger Corp., 9 Centre Park, Rochester 3, N. Y.
Domestic Engine & Pump Co., Shippensburg, Pa.
Double Seal Ring Co., 2065 Montgomery, Fort Worth, Tex.
Dover Metal Products Co., The, Canal Fulton, O.
Dow Chemical Co., The, Midland, Mich.
Dow Corning Corp., Midland, Mich.
Dowell Inc., P. O. Box 536, Tulsa 1, Okla.
Downingtown Iron Works, Wallace Ave., Downingtown, Pa.
Doyle & Roth Mfg. Co., Foot of 23rd St., Brooklyn 32, N. Y.
Doyle Vacuum Cleaner Co., 225 Stevens St., S. W., Grand Rapids 2, Mich.
●Dravo Corp., Machinery Div., Dravo Bldg., Pittsburgh 22, Pa.
Drayer & Hanson, Inc., 3301 Medford Ave., Los Angeles 33, Calif.
Dreier Brothers, 7111 Bennett Ave., Chicago, Ill.
Dreis & Krump Mfg. Co., 7404 Loomis Blvd., Chicago 36, Ill.
Dreis Co., Ltd., Edward J., 841 County Rd., San Carlos, Calif.
Dresser Mfg. Div., Dresser Industries, Inc., 490 Fisher Ave., Bradford, Pa.
Drico Industrial Corp., 559 West 35 St., New York 1, N.Y.
Drinkwater, Inc., Spring & Madison St., Waukegan, Ill.
Driv-Way Lite Co., P. O. Box 2850, Denver, Colo.
Drying Systems, Inc., 1812½ W. Foster Ave., Chicago 40, Ill.
Dryomatic Corp. of America, 1600 Union Ave., Baltimore 11, Md.
Dry-Zero Corp., Merchandise Mart, Chicago 54, Ill.
Dual-Air Fan Co., P. O. Box 169, South Elgin, Ill.
Ducon Co., 147 E. 2nd St., Mineola, N. Y.
Dudgeon, Inc., Richard, 789 Bergen St., Brooklyn 16, N. Y.
Duffy Engineering Co., 536 S. E. 6th, Portland 14, Ore.
●Dunham Co., C. A., 400 W. Madison St., Chicago 6, Ill.
Dunkirk Radiator Corp., Dunkirk, N. Y.
Duo-Therm Div., Motor Wheel Corp., Lansing 3, Mich.
du Pont de Nemours & Co., E. I., Polychemicals Dept., Wilmington 98, Del.
du Pont de Nemours & Co., E. I., Electrochemicals Dept., Wilmington 98, Del.
du Pont de Nemours & Co., Inc., E. I., Kinetic Chemicals Div., 10th and Market Sts., Wilmington 98, Del.
du Pont de Nemours & Co., Inc., E. I., Fabrics & Finishes Dept., Wilmington 98, Del.
du Pont de Nemours & Co., E. I., Grasselli Chemicals Dept., Wilmington 98, Del.
du Pont de Nemours & Co., E. I., Photo Products Dept., Wilmington 98, Del.
Durabla Mfg. Co., 114 Liberty St., New York 6, N. Y.
Durakool, Inc., 1010 N. Main St., Elkhart, Ind.
Duraloy Co., Scottdale, Pa.
●Durant Insulated Pipe Co., 1015 Runnymede St., P. O. Box 88, East Palo Alto, Calif.
Duriron Co., Inc., The, 450 U. Findlay St., Dayton 1, O.
●Durkee-Atwood Co., 215 N. E. 7th St., Minneapolis, Minn.
Duro Co., 537 Monument Ave., Dayton, O.
Duro Metal Products Co., 2649 N. Kildare Ave., Chicago, Ill.
Dust Filter Co., 134 S. LaSalle St., Chicago 3, Ill.
Dust Suppression & Engineering Co., 154 Grove St., Lake Orion, Mich.
Dustlix Corp., 715 N. Van Buren St., Milwaukee, Wis.
●Dutton Boiler Div., Hapman-Dutton Co., 623 Gibson St., Kalamazoo 6, Mich
●Dwyer Mfg. Co., F. W., 323 S. Western Ave., Chicago 12, Ill.
Dy-Check Co., Div. of Northrop Aircraft, Inc., 1515 E. Broadway, Hawthorne, Calif.
Dynamic Air Engineering, Inc., 7412 Maie Ave., Los Angeles 1,
Dzus Fastener Co., Inc., P. O. Box 185, Babylon, N. Y.

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●Eagan Co., Inc., Walter H., 2336-38 Fairmount Ave., Philadelphia 30, Pa.
Eagle Chemical Co., Inc., P. O. Box 1221, Joliet, Ill.
Eagle-Picher Co., American Bldg., Cincinnati 1, O.
Eastern Air Devices, Inc., 585 Dean St., Brooklyn 17, N. Y.
Eastern Industries Inc., 296 Elm St., New Haven 6, Conn.
Eastern Stainless Steel Corp., P. O. Box 1975, Baltimore 3, Md.
Eastman Kodak Co., Kodak Park, Rochester 4, N. Y.
Ebco Mfg. Co., 401 W. Town St., Columbus 8, O.
Eckhart Mfg. Co., Inc., 831 Lenign Ave., Union, N. J.
Eclipse Air Brush Co., Inc., 381 Park Ave., Newark, N. J.
●Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Econocol Stoker Div. of Cotta Transmission Co., 2340 11th St., Rockford, Ill.
Economy Equipment Co., 919 W. 49th Pl., Chicago 9, Ill.
Economy Valve Seat Co., 1436 N. Keating, Chicago 51, Ill.
Eddy Stoker Corp., 4717 W. North Ave., Chicago 39, Ill.
Eddy Valve Co., Waterford, N. Y.
Edge Moor Iron Wks., Inc., Edge Moor 25, Del.
Edison, Inc., Thomas A., Instrument Div., Lakeside Ave., West Orange, N. J.
Edward Valves, Inc., 1200 W. 145th St., East Chicago, Ind.
Edwards, L. V., 32 Irving Place, Rockville Center, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Eiker Mfg. Co., Ogallala, Neb.
Eisler Engineering Co., Inc., 754 S. 13th St., Newark 3, N. J.
Elastic Porcelain Lining Corp., 221 Norris Dr., Rochester 10, N. Y.
Elastic Stop Nut Corp. of America, 2330 Vauxhall Rd., Union, N. J.
Elco Tool & Screw Corp., 1800 Broadway, Rockford, Ill.
Electradiant Corp., 500 Del Monte Ave., Monterey, Calif.
Electric Arc, Inc., 152 Jelliff Ave., Newark 8, N. J.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo 1, O.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4, O.
Electric Machinery Mfg. Co., 1331 Tyler St., N. E., Minneapolis 13, Minn.
Electric Motor Corp., Div. of Howard Industries, Inc., Racine, Wis.
Electric Sprayit Co., The, 1415-25 Illinois Ave., Sheboygan, Wis.
Electric Steel Foundry Co., 2141 N. W. 25th St., Portland, Ore.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., 3501 Howard St., Skokie, Ill.
Electro Dynamic, Div. of the Electric Boat Co., Bayonne, N. J.
Electro Products Laboratories, Inc., 4501 N. Ravenswood Ave., Chicago, Ill.
Electro Rust-Proofing Corp., Belleville, N. J.
Electrol Burner Mfg. Co., Inc., 22 Union Ave., Rutherford, N. J.
Electromode Corp., 45 Crouch St., Rochester 3, N. Y.
Electro-Switch & Controls Inc., 5755 Camille Ave., Culver City, Calif.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago 7, Ill.
Elgin Softener Corp., Elgin, Ill.
Elgo Shutter & Mfg. Co., 2738 W. Warren Ave., Detroit 8, Mich.
Elliott Co., Jeannette, Pa.
Ellis Drier Co., 2444 N. Crawford Ave., Chicago 39, Ill.
Ellison Draft Gage Co., 214 W. Kinzie St., Chicago 10, Ill.
Elraco Engineering Co., 732 W. 58th St., Los Angeles 37, Calif.
Emerson Electric Mfg. Co., The, 8100 Florissant Ave., St. Louis 21, Mo.
Empire Sheet & Tin Plate Co., N. Bowman St., Mansfield, O.
Empire Ventilation Equipment Co., 35-39 Vernon Blvd., Long Island City, N. Y.
Enderle, Inc., Ltd., Frank X., 1715 San Fernando Rd., Los Angeles 65, Calif.
Endura Mfg. Corp., 45 N. 4th St., Quakertown, Pa.
Engelhard, Inc., Charles, 850 Passaic Ave., East Newark, N. J.
Engineer Co., 75 West St., New York 6, N. Y.
Engineered Products Co., 6121 Morton St., Philadelphia 44, Pa.
Enterprise Engine & Machinery Co., Div. of General Metals Corp., 18th & Florida Sts., San Francisco 10, Calif.
Equipoise Controls, 100 Stevens Ave., Mount Vernon, N. Y.
Erdle Perforating Co., 171 York St., Rochester 11, N. Y.
Ergolyte Mfg. Co., 3627 Lawrence St., N., Philadelphia 40, Pa.
Erickson Specialty Co., 10 Cayuga St., P. O. Box 141, Cohoes, N. Y.
Erie Bolt & Nut Co., Erie, Pa.
Erie City Iron Wks., 1450 East Ave., Erie, Pa.
Erie Tool Wks., 11th & French Sts., Erie 2, Pa.
Ess Instrument Co., 96 Washington Ave., Bergenfield, N. J.
Ess Specialty Corp., 96 S. Washington Ave., Bergenfield, N. J.
Essex Wire Corp., 1601 Wall Street, Ft. Wayne 6, Ind.
Essick Mfg. Co., 1950 Santa Fe Ave., Los Angeles 21, Calif.
Eston Chemicals, Inc., 3100 E. 26th St., Los Angeles, Calif.
Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.
Even-Ray Co., Inc., 93 Tiffany Blvd., Newark 4, N. J.
Everhot Products Co., 2059 W. Carroll, Chicago 12, Ill.
Everite Pump & Mfg. Co., Inc., 617 No. Prince St., Lancaster, Pa.
Everlasting Valve Co., 49 Fisk St., Jersey City 5, N. J.
Ewing Mfg. Co., 2545 N. W. 10th, Oklahoma City 7, Okla.
Excelsior Leather Washer Mfg. Co., 720-730 Chestnut St., Rockford, Ill.
Excelsior Steel Furnace Co., The, 118 S. Clinton St., Chicago 6, Ill.
Excelsior Tool & Machine Co., 31st & Ridge Ave., East St. Louis, Ill.
Extruded Plastics, Inc., New Canaan Ave., Norwalk, Conn.

F

Fasco Industries, Inc., P. O. Box 509, Rochester 2, N. Y.
Faber Engineering Co., Inc., Amber & Westmoreland Sts., Philadelphia, Pa.
Fabreeka Products Co., Inc., 222 Summer St., Boston, Mass.
Fafnir Bearing Co., 37 Booth St., New Britain, Conn.
Fageol Heat Machine Co., 5725 Mt. Elliott Ave., Detroit 11, Mich.
Fairbanks Co., 393 Lafayette St., New York 3, N. Y.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.
Fairmont Aluminum Co., Fairmont, W. Va.
Fairmount Tool & Forging, 10611 Quincy Ave., Cleveland 6, O.
Falcon Equipment Co., 13th St., New Brighton, Pa.
Falk Corp., 3010 W. Canal St., Milwaukee 8, Wis.
Falstrom Co., 26 Falstrom Court, Passaic, N. J.
Famco Machine Co., 1314 18th St., Racine, Wis.
Farley Sleeve & Hanger Co., 3748 E. 71st St., Cleveland, O.
Farquhar Co., A. B., 142 N. Duke St., York, Pa.
●Farr Co., P. O. Box 10187, Airport Station, Los Angeles 45, Calif.
Farrar & Trefts, 20 Milburn St., Buffalo 12, N. Y.
Farris Engineering Corp., 400 Commercial Ave., Palisades Park, N. J.
Farris Stacon Corp., 563 Commercial Ave., Palisades Park, N. J.
●Fedders-Quigan Corp., 57 Tonawanda St., Buffalo 7, N. Y.
Federal Boiler Co., Inc., Granite & West Sts., Midland Park, N. J.
Federal Machine & Welder Co., The, Overland Ave., Warren, O.
Federal-Mogul Corp., 11031 Shoemaker St., Detroit 13, Mich.
Federated Metals Div., American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Fee and Stemwedel, Inc., 2210 Wabansia Ave., Chicago 47, Ill.
Felt Products Mfg. Co., 1504 Carroll Ave., Chicago 7, Ill.
Felters Company, The, 210 South St., Boston 11, Mass.
Fenwal, Inc., 200 Pleasant St., Ashland, Mass.
Ferguson & Lange Foundry Co., 1039 Willow St., Chicago, Ill.
Fern, Ralph, 2517 Boulevard Ave., Scranton 9, Pa.
Ferro-Nil Corp., 381 Fourth Ave., New York 16, N. Y.
●Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Fielden Instrument Corp., 2920 N. 4th St., Philadelphia 33, Pa.
Filtair Mfg. Co., 487 S. Van Ness Ave., San Francisco 3, Calif.
Filtrine Mfg. Co., Inc., 53A Lexington Ave., Brooklyn 5, N. Y.
Finn & Co., Inc., T. R., 333 Jackson Ave., New York 54, N. Y.
Finn Engineers, Jerry, 634 Grand Ave., St. Paul 5, Minn.
Fire-King Stoker Co., 3760 E. St. Clair, Indianapolis, Ind.
Fireline Stove & Furnace Lining Co., 1800 Kingsbury St., Chicago 14, Ill.
Firestone Industrial Products, 1200 Firestone Pkwy., Akron 17, O.
Fir-Tex Insulating Board Co., St. Helens, Ore.
Fischer & Porter Co., 600 County Line Rd., Hatboro, Pa.
Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.
●Fisher Governor Co., 205 S. First Ave., Marshalltown, Ia.
Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.
Fitch, Allen & Co., 1131 Bryn Mawr Ave., Chicago 40, Ill.
●Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York 17, N. Y.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia 2, Pa.
Flemm Lead Co., Inc., Bradley Ave. & School St., Long Island City 1, N. Y.
Flexible Tubing Corp., Guilford, Conn.
Flexitallic Gasket Co., 8th & Bailey Sts., Camden, N. J.
Flexlock Corp., 411 E. Market St., Akron, O.
Flexo Supply Co., Inc., 4649 Page Blvd., St. Louis 13, Mo.
Flexrock Co., 36 & Filbert Sts., Philadelphia 4, Pa.
Flintkote Co., The, 30 Rockefeller Plaza, New York 20, N. Y.
Flori Pipe Co., The, 601 E. Red Bud Ave., St. Louis 15, Mo.
Floridin Co., Warren, Pa.
Fluid Heat Div., Anchor Post Products, Inc., 6500 Eastern Ave., Baltimore 24, Md.
●Fluid Systems, Inc., 1881 Dixwell Ave., New Haven, Conn.
Fluor Corp., Ltd., The, 2500 S. Atlantic Blvd., Los Angeles 22, Calif.
Flynn & Emrich Co., 301 Holliday St., Baltimore 2, Md.
Follansbee Steel Corp., 3rd and Liberty Aves., Pittsburgh, Pa.
Forney Engineering Co., 2705 Hawes St., Dallas 9, Tex.
Ft. Worth Steel & Machinery Co., P. O. Box 1038, Ft. Worth, Tex.
Forty-Eight Insulations, Inc., East River Rd., N. Aurora, Ill.
Fossum, M. H., 2086 Marshall Ave., St. Paul, Minn.
Foster Co., Benjamin, 4635 W. Girard Ave., Philadelphia 31, Pa.
Foster Engineering Co., 835 Lehigh St., Union, N. J.
Foster Pump Wks., Inc., 46-A Washington St., Brooklyn 1, N. Y.
●Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Fram Corp., Providence 16, R. I.
France Packing Co., 6512 State Rd., Tacony, Philadelphia 35, Pa.
Franklin Electric Co., Inc., 116 E. Washington St., Bluffton, Ind.
Frederick Iron & Steel Inc., E. 7th St., Frederick, Md.
Freed Products Co., 1510 Third Ave., Moline, Ill.
Freeman Stoker Div., Illinois Iron & Bolt Co., 914 S. Michigan Ave., Chicago 5, Ill.
Fresh'nd-Aire Co., Div. of Cory Corp., 221 N. LaSalle St., Chicago 1.
Fretz-Moon Tube Co., Inc., Butler, Pa.
●Frick Co., Waynesboro, Pa.
Fricke, Fred J., 4404 Avenida Estrellita, Albuquerque, N.M.
Friermood Machine Works, Converse, Ind.
Friez Instrument Div., Bendix Aviation Corp., Taylor Ave., Towson, Baltimore 4, Md.
Frigidaire Div., General Motors Corp., Dayton 1, O.
Frost Mfg. Co., S. Henderson St., Galesburg, Ill.
Fuel Savers, Inc., 15th and Herr Sts., Harrisburg, Pa.
Fuelguard Co., 5643 Dyer St., Dallas 6, Tex.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Fuller Co., 124 Bridge St., Catasauqua, Pa.
Fuller Co., D. William, 2320 E. 75th St., Chicago 49, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Box 400, Knoxville 4, Tenn.
Furnas Electric Co., Batavia, Ill.

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G

G. D. S. Machinery & Supply Co., Inc., 101 Walker St., New York. N. Y.
G & H Mfg. Co., 3047 Amber St., Philadelphia 34, Pa.
G. M. Mfg. Co., 50 W. 3rd St., New York 12, N. Y.
●G & O Mfg. Co., 138 Winchester Ave., New Haven 8, Conn.
●Gallaher Co., The, 4108 Dodge St., Omaha 3, Neb.
Galv-Weld Products, 602 Cook Tower, Lima, O.
Gannon Co., Inc., Russell R., The, 5037 Beech St., Cincinnati 12, O.
Garden City Fan Co., 332 S. Michigan Ave., Chicago 4, Ill.
Garden City Instruments, Inc., 608 S. Dearborn St., Chicago 5, Ill.
Gardiner Metal Co., 2514 W. 48th Pl., Chicago 32, Ill.
Gardner-Denver Co., Quincy, Ill.
Garlock Packing Co., 50 Main St., Palmyra, N. Y.
Gas & Oil Industry Laboratories, Inc., 4 Paine Ave., Irvington, N. J.
Gasflux Co., Mansfield, O.
Gates & Co., Inc., George W., Hempstead Turnpike & Lucille Ave., Franklin Sq., L. I., N. Y.
Gates Engineering Co., P. O. Box 1711, Wilmington, Del.
Gates Rubber Co., The, 999 S. Broadway, Denver 17, Colo.
Gateway Engineering Co., 3233 W. Grand Ave., Chicago, Ill.
Gatke Corp., 228 N. LaSalle St., Chicago 1, Ill.
Gehri Co.. 1117 Tacoma Ave.. Tacoma 3, Wash.
General Blower Co., 8610 Ferris Ave., Morton Grove, Ill.
General Blower Co., Inc., 6137 Market St., Philadelphia 39, Pa.
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General Controls Co., 801 Allen Ave., Glendale 1, Calif.
General Corporation, 3353 University Ave., Minneapolis 14. Minn.
General Die and Stamping Co., 262-272 Mott St., New York 12, N. Y.
General Electric Co., Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.
General Electric Co., Apparatus Dept., 1 River Rd., Schenectady 5, N. Y.
General Electric Co., Chemical Dept., 1 Plastics Ave., Pittsfield, Mass.
General Electric Co., Lamp Dept., Nela Park, Cleveland 12, O.
General Electric Co., Meter and Instrument Dept., Schenectady 5, N. Y.
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General Filter Co., 923 Second Ave., Ames, Ia.
General Filters, Inc., 12890 Westwood, Detroit 23, Mich.
●General Fittings Co., 123 Georgia Ave., Providence 5, R. I.
General Gas Light Co., 212 N. Park, Kalamazoo 11F, Mich.
General Heaters & Regulators Co., 4102 S. LaSalle St., Chicago 9.
General Insulating Products Co., 8821 15th Ave., Brooklyn, N. Y.
General Machinery Co., 3500 Riverside Ave., Spokane 1, Wash.
General Ozone Corp., 1455 W. Congress St., Chicago 7, Ill.
General Plate Div., Metals & Controls Corp., 34 Forest St., Attleboro, Mass.
General Power Plant Corp., 381-4th Ave., New York 16, N. Y.
General Scientific Equipment Co., 27th & Huntingdon Sts., Philadelphia 32, Pa.
Genspring, Inc., 500 Fifth Ave., New York 18, N. Y.
Gerett Corp., M. A., 724 W. Winnebago St., Milwaukee 5, Wis.
Germatrol Corp., 622 Brookline Blvd., Pittsburgh 26, Pa.
Gerstein & Cooper Inc., 1 W. 3rd St., South Boston, Mass.
Giannini & Co., Inc., G. M., 254 W. Colorado St., Pasadena 1, Calif.
Giant Mfg. Co., South Ave., Council Bluffs, Ia.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gilbert Brass Foundry Co., 5028 Farlin St., St. Louis, Mo.
Gil-Lair Products, Inc., 81 Masonic Ct., Pasadena 3, Calif.
Gilmer Company, L. H., Div. of United States Rubber Co., Tacony, Philadelphia 35, Pa.
Gisholt Machine Co., 1253 E. Washington Ave., Madison 10, Wis.
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●Glasfloss, 155 E. 44th St., New York 17, N. Y.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Glenn-Roberts Co., Inc., 2107 Adams St., Indianapolis 18, Ind.
Globe Phone Mfg. Co., 2 Linden St., Reading, Mass.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Goese Mfg. Co., 2548 N. 18th St., Milwaukee 6, Wis.
Goethel Sheet Metal Wks., Alfred, 3218 W. Fond du Lac Ave., Milwaukee 10, Wis.
Goettl Bros. Metal Prod. Inc.. 714 S. Central Ave., Phoenix, Ariz.
Golden-Anderson Valve Specialty Co., Keenan Bldg., Pittsburgh, Pa.
Goldens' Foundry & Machine Co., Columbus, Ga.
Gold Top Heating, Inc., 1400 E. Second St., Butte, Mont.
Goodfellow Co., E. D., 496 E. Bodley Ave., Memphis, Tenn.
Goodrich Co., B. F., 548 S. Main St., Akron 18, O.
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron 16, O.
Goodyer Industries, Inc., 224 S. Michigan Ave., Chicago 4, Ill.
Gordon & Piatt, P. O. Box 331, Winfield, Kan.
Gorman-Rupp Co., Mansfield, O.
Gorton Heating Corp., Cranford, N. J.
Goss Gas Inc., 5209 Baum Blvd., Pittsburgh 24, Pa.
Gotham Instrument Co., Div., American Machine & Metals, Inc., 149 Wooster St., New York 12, N. Y.
●Goulds Pumps, Inc., Fall St., Seneca Falls, N. Y.
●Governair Corp., 513 N. Blackwelder St., Oklahoma City 1, Okla.
Grabler Mfg. Co., 6565 Broadway, Cleveland 5, O.
Graham Mfg. Co., Inc., 415 Lexington Ave., New York 17, N. Y.
Graham Transmissions, Inc., 3754 N. Holton St., Milwaukee 12, Wis.
Granite City Steel Co., 20th & Madison Ave., Granite City, Ill.
●Grant Wilson Inc., 141 W. Jackson Blvd., Suite 1560, Chicago, Ill.
Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.
Graver Water Conditioning Co., 216 W. 14th St., New York 11, N. Y.
Gray Co., Inc., Graco Square, Minneapolis 13, Minn.
Gray Metal Products, Inc., 30 Carleton St., Rochester, N. Y.
Great National Air Conditioning Corp., 342 Oklahoma Natural Bldg., Oklahoma City, Okla.
Green Fire Brick Co., A. P., Mexico, Mo.
Green Fuel Economizer Co., 780 Main St., Beacon, N. Y.
Greene, Tweed & Co., North Wales, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., 2136 12th St., Rockford, Ill.
Greer Hydraulics, Inc., 454 18th St., Brooklyn 15, N. Y.
Greiner Co., Emil, 20-26 N. Moore St., New York 13, N. Y.
Greyhound A. C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y.
Grief, Edward C., 64 West End Ave., Bogota, N. J.
Griffin & Co., 500 Bergman Ave., Louisville 8, Ky.
Griffith Equipment Co., Inc., Los Angeles, Calif.
●Grinnell Co., Inc., 260 W. Exchange, Providence 1, R. I.
Grip Nut Co., 310 S. Michigan Ave., Chicago, Ill.
Griscom-Russell Co., The, 285 Madison Ave., New York 17, N. Y.
Gro-Quick Co., 340 W. Huron St., Chicago 10, Ill.
Gross-Aire Mfg. Co., 9416 W. Milton Ave., Overland 14, Mo.
Grove Regulator Co., 6529 Hollis St., Oakland, Calif.
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago 12, Ill.
Guardian Products Corp., 1215 E. 2nd St., Michigan City, Ind.
Guild & Garrison, Inc., 43 Keap St., Brooklyn 11, N. Y.
Gulf Oil Corp., P. O. Box 1166, Gulf Bldg., Pittsburgh 30, Pa.
Gunnite Foundries Corp., 302 Peoples Ave., Rockford, Ill.
Gustin-Bacon Mfg. Co., 210 W. 10th St., Kansas City 6, Mo.
Guth Co., Edwin F., 2615 Washington Blvd., St. Louis 3, Mo.

H

H. A. Mfg. Co., 1612 W. King St., York, Pa.
H-B Instrument Co., 2633 Trenton Ave., Philadelphia 25, Pa.
H & G Plumbing Products, Inc., 6 E. Ohio Ave., Port Washington N. Y.
H & H Tube & Mfg. Co., 245-275 N. Forman Ave., Detroit 17, Mich.
Haering & Co., Inc., D. W., P. O. Box 6037, Harlandale Sta., San Antonio, Tex.
Haertel Co., Walter, 2840 4th Ave., S., Minneapolis, Minn.
Hagan Corp., Hagan Bldg., Pittsburgh 30, Pa.
Hager Bros., East P. O. Box 1511, Rockford, Ill.
Hague & Co., Alfred, 230 Thirty-fourth St., Brooklyn 32, N. Y.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., 1010-12-14 Wood St., Philadelphia 7, Pa.
Halstead & Mitchell, Bessemer Bldg., Pittsburgh 22, Pa.
Hamburg Boiler Wks., Inc., Grand St., Hamburg, Pa.
Hamer Oil Tool Co., 2919 Gardenia Ave., Long Beach 6, Calif.
Hamilton Rubber Mfg. Corp., Box 361, Trenton 3, N. J.
Hammel-Dahl Co., 243 Richmond St., Providence 3, R. I.
Hammett Electric Mfg. Co., 209 W. 19th Terrace, Kansas City 8, Mo.
Hammond Brass Wks., Summer Blvd., Hammond, Ind.
Hampton-Cross Co., The, 120 S. 10th St., Louisville 2, Ky.
Hampton Electric Mfg. Co., 1238 Voskamp St., Pittsburgh 12, Pa.
Handy & Harman, 82 Fulton St., New York 38, N. Y.
Haney Gas Burner & Engineers, 909 S. Myrtle Ave., Monrovia, Calif.
Hanovia Chemical & Mfg. Co., 100 Chestnut St., Newark 5, N. J.
Hansen Mfg. Co., Inc., Princeton 6, Ind.
Hanson-Gates Mfg. Co., Inc., 174 Lowell St., Reading, Mass.
Hardinge Oil Burner & Mfg. Co., 1700 Berteau St., Chicago 13, Ill.
Hardy, Inc., Charles, 420 Lexington Ave., New York, N. Y.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Harper Co., H. M., Morton Grove, Ill.
●Harrington & King Perforating Co., 5655 Fillmore St., Chicago 44, Ill.
Harris, A. R., 4548 Hohman Ave., Hammond, Ind.
Harris Calorific Co., The, 5501 Cass Ave., N. W., Cleveland 2, O.
Harris & Co., Arthur, 210 N. Aberdeen St., Chicago 7, Ill.
Harrisburg Machinery Corp., 7th & Curtin St., Harrisburg, Pa.
Harrisburg Steel Corp., 10th & Herr Sts., Harrisburg, Pa.
Harry Cooling Towers, Inc., 125 Cedar St., New York 6, N. Y.
Hart & Cooley Mfg. Co., Holland, Mich.
Hart Mfg. Co., The, Hamilton St., Hartford 1, Conn.
Hartmann Co., Chas., 985 Dean St., Brooklyn, N. Y.
Hartzell Propeller Fan Co., P. O. Box 909, Roosevelt Ave., Piqua, O.
Harvey-Whipple, Inc., Springfield, Mass.
Hasco Valve & Machine Co., 1263 N. 70th St., Milwaukee 13, Wis.
Haskell Mfg. Co., Wm. H., 20 Commerce St., Pawtucket, R. I.
Hastings Air Conditioning Co., Box 481, 108 S. Colorado Ave., Hastings, Neb.
●Hastings Instrument Co., Inc., P. O. Box 1275, Hampton, Va.
Hauck Mfg. Co., 127-137 10th St., Brooklyn 15, N. Y.
Hausman Mfg. & Sales Co., Dept. HP, 1243 N. Harding Ave., Chicago 51, Ill.
Haveg Corp., Newark, Del.
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●Hayes Furnace Mfg. & Supply Co., 2929 S. Fairfax Ave., Los Angeles 16, Calif.
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Health Trola Div., Excel Heating & Air Conditioning Co., 3715 Belmont Ave., Chicago 18, Ill.
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Heartley Machine & Tool Co., 900-8 Summit St., Toledo, O.
Heat Equipment not Inc., 1020 E. 75th St., Chicago 19, Ill.
Heat Timer Corp., 160 Fifth Ave., New York 10, N. Y.
Heat X-Changer Co., Inc., The, Brewster, N. Y.
Heating Assurance, Inc., 124 E. Augusta St., Spokane 13, Wash.
Hegeler Zinc Co., P. O. Box 599, Danville, Ill.

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Heilman Boiler Wks., Allentown, Pa.
Helical Tube Corp., 19 Washington Street, East Orange, N. J.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn.
Hendley & Whittemore, 6 Blackhawk Blvd., Beloit, Wis.
●Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
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●Henry Valve Co., Melrose Park, Ill.
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Herbusch Corp., The, 706 Chestnut St., 210 Title Guaranty Bldg., St. Louis 1, Mo.
Hercules Chemical Co., Inc., 332 Canal St., New York 13, N. Y.
Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.
Heremetal Co., 1310 Aldrich Ave., N. Minneapolis 11, Minn.
Heresite & Chemical Co., Manitowoc, Wis.
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Hertner Electric Co., The, 12690 Elmwood Ave., Cleveland 11, O.
Hess Co., The, 132 N. Clinton St., Chicago 6, Ill.
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Horton Mfg. Co., 3016 University Ave., S. E., Minneapolis 14, Minn.
Hossfeld Mfg. Co., 460 W. Third St., Winona, Minn.
Hotpoint Inc., 5600 W. Taylor St., Chicago 44, Ill.
Hotstream Heater Co., 2363 E. 69th St., Cleveland 4, O.
Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Howard Iron Wks. & Alberger Heater Div., 287 Chicago St., Buffalo 4, N. Y.
Howe Ice Machine Co., 2825 Montrose Ave., Chicago 18, Ill.
Howell Electric Motors Co., Howell, Mich.
Howes-Woods Co., 201 Bridge St., Cambridge, Mass.
Hubbell Corp., P. O. Box 700, Hawley Rd., Mundelein, Ill.
Humboldt Mfg. Co., 2016 N. Whipple St., Chicago, Ill.
Hunt & Son, C. B., Inc., Salem, O.
Hunter Fan and Ventilating Co., Inc., 400 S. Front St., Memphis, Tenn.
Hupp Corp., Globe Stamping Div., 1250 W. 76th St., Cleveland 2, O.
Huron Boiler Co., 10457 Gratiot Ave., Detroit 13, Mich.
Hussey & Co., C. G., 2850 Second Ave., Pittsburgh 19, Pa.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia 8, Pa.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Hypro Engineering Co., 440 N. Washington Ave., Minneapolis, Minn.

I

Ideal Electric & Mfg. Co., E. First & Oak Sts., Mansfield, O.
Ideal Industries, Inc., 1096 Parke Ave., Sycamore, Ill.
Iden Associates, 1809 N. Milwaukee Ave., Chicago 47, Ill.
●Ilg Electric Ventilating Co., 2841 N. Crawford Ave., Chicago 41, Ill.
●Illinois Engineering Co., Racine Ave. at 21st St., Chicago 8, Ill.
Illinois Malleable Iron Co., 1801 Diversey Parkway, Chicago 14, Ill.
Illinois Oil Products, Inc., 4th Ave. and 24th St., Rock Island, Ill.
Illinois Testing Laboratories, Inc., 420 N. La Salle St., Chicago 10, Ill.
Illinois Zinc Co., 2959 W. 47th St., Chicago 32, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7, Ill.
Imperial Electric Co., 64 Ira Ave., Akron, O.
Independent Pneumatic Tool Co., 175 N. State St., Aurora, Ill.
●Independent Register Co., 3747 E. 93rd St., Cleveland 5, O.
Indiana Fan Company, 427 S. Alabama St., Indianapolis 4, Ind.
●Industrial Acoustics Co., Inc., 333 Jackson Ave., New York 54, N. Y.
Industrial Engineering Corp., Terre Haute, Ind.
Industrial Engineering & Equipment Co., 711 S. Theresa Ave., St. Louis 3, Mo.
Industrial Mfg. & Engineering Co., 3845 N. Ravenswood Ave., Chicago 13, Ill.
Industrial Metal Protectives, Inc., 401 Homestead Ave., Dayton 8, O
Industrial Screw Co., 711 W. Lake St., Chicago 6, Ill.
Industrial Service Laboratories, 7656 W. Forest Home Ave., Milwaukee 14, Wis.
●Industrial Sound Control, Inc., 45 Granby St., Hartford, Conn., an

●Infra Insulation, Inc., 10 Murray St., New York, N. Y.
Ingersoll Products Div., Borg-Warner Corp., 321 S. Plymouth Ct., Chicago 4, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Inland Steel Products Co., P. O. Box 393, Milwaukee 1, Wis
Inner-Tite Div. of Yara Engineering Corp., 18 W. Jersey St., Elizabeth 4, N. J.
Instant Drying Corp., 101 Park Ave., New York, N. Y.
Insto-Gas Corp., 1977 E. Woodbridge St., Detroit 7, Mich.
Insulite Div. Minnesota and Ontario Paper Co., 500 Baker Arcad Bldg., Minneapolis 2, Minn.
Insul-Wool Insulation Corp., 121 N. Dodge, Wichita 12, Kans.
Inter-Coastal Paint Corp., 13th St. and Southern R. R., East St. Louis Ill.
Interchemical Corp., Finishes Div., 57 State St., Newark 1, N. J.
International Boiler Works Co., The, East Stroudsburg, Pa.
International Engineering, Inc., 1145 Bolander Ave., Dayton 1, O.
International Engineering Wks., Inc., Box 71, Framingham, Mass.
International Heater Co., 101 Park Ave., Utica 2, N. Y.
International Mfg. Co., 600 E. Grand Ave., Oklahoma City, Okla.
International Metal Products Co., Phoenix, Ariz.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
International Powder Metallurgy Inc., Ridgway, Pa.
International Register Co., 2624 W. Washington Blvd., Chicago 12, Ill
International Sales Co., 2045 Evans Ave. San Francisco 24, Calif.
International Steel Co., 1545 Edgar St., Evansville, Ind.
International Vermiculite Co., Girard, Ill.
Interstate Sales Co., 123 E. 18th St., New York 3, N. Y.
Iona Ventilator Co., Inc., 2821-29 W. Dauphin St., Philadelphia 32
Iron City Chemical Co., Glycolator Division, Valencia, Pa.
●Iron Fireman Mfg. Co., 3170 W. 106 St., Cleveland 11, O.
Iron Lung Ventilator Co., 4019 Prospect Ave., Cleveland 3, O.
Irvington Varnish and Insulator Co., 6 Argyle Terrace, Irvington 11 N. J.
Isoflex Corp., 989 Folsom St., San Francisco 7, Calif.
Iwan Brothers, Inc., 1503 Prairie Ave., South Bend 14, Ind.

J

J O Mfg. Co., 8442 Otis St., South Gate, Calif.
Jabsco Pump Co., 2031 Lincoln St., Burbank, Calif.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Jackson Co., Byron, P. O. Box 2017, Terminal Annex, Los Angeles 54
●Jackson & Church Co., 321 N. Hamilton Ave., Saginaw 65, Mich.
Jacobs Co., B. & J., 1729 John St., Cincinnati 14, O.
Jacuzzi Bros., Inc., 5327 Jacuzzi Ave., Richmond, Calif.
Jaden Mfg. Co., 1601 Second St., Hastings, Neb.
James-Pond-Clark, 1247 E. Green, Pasadena, Calif.
Jamieson Mfg. Co., 819 Bedford, Dallas, Tex.
●Jan Air, Inc., Richmond, Ill.
Janette Elect. Mfg. Co., Lehigh at Main, Morton Grove, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
●Jefferson Union Co., 607 W. 26th St., New York 1, N. Y.
Jeffrey Mfg. Co., 859 N. Fourth St., Columbus 16, O.
●Jenkins Bros., 100 Park Ave., New York 17, N. Y.
●Jenn Air Products Co., 409 Architects Bldg., Indianapolis, Ind.
Jennison Co., 87 Putnam St., Fitchburg, Mass.
Jessop Steel Co., Washington, Pa.
Jewel Mfg. Co., 1841 University Ave., St. Paul 4, Minn.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Johnson Bronze Co., 460 S. Mill St., New Castle, Pa.
Johnson Co., S. T., 401 N. Broad St., Philadelphia 8, Pa.
Johnson Corp., The, 806 Wood St., Three Rivers, Mich.
Johnson Gas Appliance Co., 520 "E" Ave., N. W., Cedar Rapids, Ia.
Johnson Heater Corp., 12 Newhall Ave., Saugas, Mass.
Johnson Machine Works, 619 Menomonie St., Eau Claire, Wis.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Johnson Metal Hose, Inc., 10 Sperry St., Waterbury 20, Conn.
●Johnson Service Co., 507 E. Michigan St., Milwaukee 2, Wis.
Johnston Bros., Inc., Ferrysburg, Mich.
Johnston & Chapman Co., 2925 Carroll Ave., Chicago 12, Ill.
Johnston & Jennings Co., 877 Addison Rd., Cleveland 14, O.
Johnston Foil Mfg. Co., 6100 S. Broadway, St. Louis 11, Mo.
Jones Foundry & Machine Co., W. A., 4401 Roosevelt Rd., Chicago 24, Ill.
Jones & Laughlin Steel Corp., Third Ave. & Ross St., Pittsburgh 30, Pa.
Jordan & Co., Inc., Paul R., 311 E. South St., Indianapolis 4, Ind.
●Joy Mfg. Co., Henry W., Dept. 20, Oliver Bldg., Pittsburgh 22, Pa.
Justrite Mfg. Co., 2061 N. Southport Ave., Chicago, Ill.
Justus Steam Trap Co., Napanoch, N. Y.

K

Kainer & Co., 763 W. Lexington St., Chicago 7, Ill.
●Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif.
Kaiser Co., E. B., 625 Webster Ave., Chicago 14, Ill.
Kaiser Co., H. S., 3336 Franklin Blvd., Chicago, Ill.

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Kane Mfg. Corp., Kane, Pa.
Kates Co., W. A., 430 Waukegan Rd., Deerfield, Ill.
Kauffman Air Conditioning Corp., 4505 Olive St., St. Louis 8, Mo.
Kaufman Co., H. J., The, 13215 Roselawn Ave., Detroit 4, Mich.
Kaye & McDonald, Inc., 11-15 Central Ave., West Orange, N. J.
Kaylo Div., Owens-Illinois Glass Co., Box 1035, Toledo 1, O.
Keasbey Co., Robert A., 139-149 W. 19th St., New York, N. Y.
●Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Keckley Co., O. C., 400 W. Madison St., Chicago 6, Ill.
Keeler Co., E., 238 West St., Williamsport 3, Pa.
Keeney Mfg. Co., Main St., Newington 11, Conn.
Kehm Corp., The, 135 S. La Salle St., Chicago 3, Ill.
Keller Tool Co., P. O. Box 268, Grand Haven, Mich.
Kellogg Co., M. W., The, 225 Broadway, New York 7, N. Y.
Kelley Koett Mfg. Co., The, 212 W. 4th St., Covington, Ky.
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit 32, Mich.
Kenco, Inc., 1125 North Ridge Rd., Lorain, O.
Kenite Laboratory, Inc., 100 Kings Rd., P. O. Box 268, Madison, N. J.
●Kennard Corp., 1819 S. Hanley Rd., St. Louis 17, Mo.
●Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kenney Co., L. C., 2300 W. 59th St., Chicago 36, Ill.
Kensico Tube Co., Mt. Kisco, N. Y.
Kerentoff, G. L., 2218 Reading Rd., Cincinnati 2, O.
Kern Co., John A., 224 N. Loomis St., Chicago 7, Ill.
Kernchen Co., 333 N. Michigan, Chicago, Ill.
Kerotest Mfg. Co., 2525 Liberty Ave., Pittsburgh 22, Pa.
Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill.
●Kewanee Boiler Corp., Franklin St. and "Q" Tracks, Kewanee, Ill.
●Key Co., 2617 McCasland, East St. Louis, Ill.
Keystone Asphalt Products Co., 101 E. Ontario St., Chicago 11, Ill.
Keystone Carbon Co., Inc., 1935 State St., St. Marys, Pa.
Kidder Mfg. Co., Inc., J. F., 426 Colchester Ave., Burlington, Vt.
Kieley & Mueller, Inc., 2015 43rd St., North Bergen, N. J.
Kilbury Mfg. Co., Inc., 14529 Hawthorne Blvd., Lawndale, Calif.
Kimberly-Clark Corp., Neenah, Wis.
Kindl-Air Corp., 1480 W. 112th St., Cleveland, Ohio
●King Co., The, 928 N. Cedar St., Owatonna, Minn.
King Engineering Corp., 945 Willard Ave., Ann Arbor, Mich.
King Union Co., Inc., Hillsgrove, R. I.
Kingsford Foundry & Machine Wks., 264 W. Second St., Oswego, N. Y.
Kingston Products Corp., 1415 N. Webster, Kokomo, Ind.
Kinney Mfg. Co., 3529 Washington St., Boston 30, Mass.
Kirk & Blum Mfg. Co., 3120 Forrer St., Cincinnati 9, O.
Kisco Boiler & Engineering Co., 2414 Dekalb St., St. Louis 4, Mo.
Klauer Mfg. Co., 9th and Washington Sts., Dubuque, Ia.
Kleenaire Corp., 409 Jefferson St., Stevens Point, Wis.
Kleen-Heet, Inc., 1823 Carroll Ave., Chicago 12, Ill.
Klenk's Aviation Snips, 107 E. 5th St., Wilmington, Del.
Kling Bros., Engineering Works, 1320 N. Kostner Ave., Chicago 51, Ill.
Klingerit. Inc., 16-22 Hudson St., New York 13, N. Y.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., 1001 Laurel Ave., Hamilton, O.
Klomparens Lock-Joint Mfg. Co., Inc., 4600 Bowen Rd., S. E., Washington 19, D. C.
Kluegel & Co., E., 187 W. Kellogg Blvd., St. Paul, Minn.
Knapp Bros. Mfg. Co. Inc., P. O. Box 7, Cincinnati 36, Ohio
Knight, Maurice A., Kelly Ave., Akron 9, O.
Knowles Mushroom Ventilator Co., 583 Upper Mountain Ave., Upper Montclair, N. J.
Knuth Engineering Co., 2617 N. St. Louis, Chicago, Ill.
Kobe Inc., Div. of Dresser Equipment Co., Huntington Park, Calif.
Kol-Master Corp., 161 Walberg St., Oregon, Ill.
Kold-Hold Mfg. Co., Lansing 4, Mich.
Kool-Sleep, Inc.. Cambridge, O.
Kopperman & Sons, Joseph, 316 New St., Philadelphia 6, Pa.
Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa.
Korfund Co., Inc., 48-01-F 32nd Pl., Long Island City 1, N. Y.
Koven & Bro., L. O., Inc., 154 Ogden Ave., Jersey City 7, N. J.
Kraissl Co., Inc., The, Terhune and Williams Aves., Hackensack, N. J.
●Kramer Trenton Co., N. Olden & Bruening Aves., Trenton 5, N. J.
Kraus Co., Walter S., 48-02 43rd St., Woodside, L. I., N. Y.
Krauser-Boyd, Inc., North Tonawanda, N. Y.
Krehbiel Co., J. H., 425 N. Crawford Ave., Chicago, Ill.
●Kritzer Radiant Coils, Inc., 2901 W. Lawrence Ave., Chicago 25, Ill.
Krueger Sentry Gauge Co., 1056 W. Mason St., Green Bay, Wis.
Kuhns Bros. Co., 1800 McCall St., Dayton 8, O.
Kunkle Valve Co., 121 S. Clinton St., Ft. Wayne 2, Ind.
Kwikon Co., 1850 W. Washington, Chicago 12, Ill.
Kynex Co., 21 West St., New York 6, N. Y.

L

LaBour Co., Inc., The, 1301 Sterling Ave., Elkhart, Ind.
Laclede-Christy Co., Arcade Bldg., St. Louis 1, Mo.
Laclede Steel Co., Arcade Bldg., Rm. 1317, St. Louis 1, Mo.
Laclede Stoker Co., 4438 Hunt Ave., St. Louis 10, Mo.
La Crosse Steel Roofing & Corrugating Co., 227 Jay St., La Crosse, Wis.
●Ladish Co., 5300 S. Packard Ave., Cudahy, Wis. (Milwaukee Suburb).
Lake Chemical Co., 3052 W. Carroll Ave., Chicago 12, Ill.
Lamb Electric Co., Kent, O.
Lammert & Mann Co., Wood & Walnut Sts., Chicago 12, Ill.
Lamson Corp., Blower Div., Syracuse 1, N. Y.
Lamson & Sessions Co., 1971 W. 85th St., Cleveland, O.
Lancaster Heat Transfer Co., Inc., 123 DeKalb Ave., Brooklyn, N. Y.
Landis & Gyr, Inc., 104 Fifth Ave., New York 11, N. Y.
Landis Machine Co., Inc., Fifth and Church Sts., Waynesboro, Pa.
Larkin Packer Co., 6200 Maple Ave., St. Louis 14, Mo.
Larkin Coils, Inc., 519 Memorial Dr., S. E., Atlanta 1, Ga.
Lastik Products Co., Inc., 203 Iroquois Bldg., Pittsburgh 13, Pa.
Lau Blower Co., 2001 Home Ave., Dayton 7, O.
Lawler Automatic Controls, Inc., 453 N. MacQuesten Pkwy., Mount Vernon, N. Y.
Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass.
Layne & Bowler, Inc., Box No. 6815, Hollywood Sta., Memphis 8, Tenn.
Leach Relay Co., 5919 Avalon Blvd., Los Angeles 3, Calif.
Lead Lined Iron Pipe Co., 1 Broadway, Wakefield, Mass.
Leahy Mfg. Co., Los Angeles, Calif.
Leavitt Machine Co., East River St., Orange, Mass.
Lecourtenay Co., 5 Maine St., Newark 5, N. J.
Ledeen Mfg. Co., 1602 S. San Pedro St., Los Angeles 15, Calif.
Lee Co., K. O., Aberdeen, S. D.
Lee Corp., 1001 E. Tatnall St., Wilmington, Del.
Lee & Son, Thomas, 128-132 W. Second St., Cincinnati 2, O.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia 44, Pa.
Lees, John, Div., The, Serrick Corp., Batavia St. and Kilgore Ave., Muncie, Ind.
Leffel & Co., James, 426 East St., Springfield, O.
Lehigh Fan & Blower Co., 17th and Sumner Ave., Allentown, Pa.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.
Leinweber Aluminum Nozzles, 8448 Crandon, Chicago, Ill.
Leland Electric Co., 1501 Webster St., Dayton 1, O.
Lenk Mfg. Co., 30 Cummington St., Boston 15, Mass.
Lennox Furnace Co., Marshalltown, Ia.
Leonard Valve Co., 1360 Elmwood Ave., Cranston 9, R. I.
●Leslie Co., 237 Grant Ave., Lyndhurst, N. J.
Leslie Welding Co., 2943 Carroll Ave., Chicago 12, Ill.
Levow, David, 308 W. 20th St., New York 11, N. Y.
Lewellen Mfg. Co., Columbus, Ind.
Lewin-Mathes Co., Lewin Metals Div., 1111 Chouteau Ave., St. Louis 2, Mo.
Lewis & Co., Inc., Chas. S., 2207 Pine St., St. Louis 3, Mo.
Lewis & Co., Joseph E., 1319 Carroll St., Baltimore, Md.
Leyman Mfg. Corp., John H. McGowan Co. Div., 1416 First National Bank Bldg., Cincinnati 2, O.
Libbey-Owens-Ford Glass Co., Nicholas Bldg., Toledo 3, O.
Libert Machine Co., 324 N. Roosevelt St., Green Bay, Wis.
Lieblich Oil Burner Inc., 36 W. 66th St., New York, N. Y.
Lientz Co., B. P., P. O. Box 2275, Kansas City, Mo.
●Lilie-Hoffmann Cooling Towers, Inc., 4239 Duncan Ave., St. Louis 10, Mo.
Lima Electric Motor Co., The, Lima, O.
Lima Register Co., The, 651 N. Baxter St., Lima, O.
Lincoln Electric Co., The, 22801 St. Clair Ave., Cleveland 17, O.
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Lindsay Structure, Inc., 5000 W. Dempster St., Skokie, Ill.
Lindy Heaters, Inc., 2370 Hoffman St., New York 57, N. Y.
Linear Incorporated, N. W. Cor. State Rd. & Levick St., Philadelphia 35, Pa.
Link-Belt Co., 307 N. Michigan Ave., Chicago 1; 300 W. Pershing Rd., Chicago 9, Ill., 519 N. Holmes Ave. and 220 S. Belmont Ave., Indianapolis 6, Ind., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.
Lintern Co., 60 Lincoln Ave., Berea, O.
Lipman Refrigeration Div., Yates-American Co., Beloit, Wis.
Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago 23, Ill.
Liquid Carbonic Corp., Industrial Gas Div., 3100 S. Kedzie Ave., Chicago 23, Ill.
Liquidepth Indicators, Inc., 43-22 Tenth St., Long Island City 1, N. Y.
Liquidometer Corp., 37-15 Skillman Ave., Long Island City 1, N. Y.
Lissberger & Son, Inc., Marks, 23-01 Borden Ave., Long Island City, N. Y.
Lithcote Corp., 333 W. 40th Pl., Chicago 9, Ill.
Little Giant Vaporizer Co., Inc., 5105 Classen Blvd., P. O. Box 3535, Oklahoma City 6, Okla.
Little Mfg. Co., M. S., 151 New Park Ave., Hartford 6, Conn.
Littleford Bros., Inc., 453 E. Pearl St., Cincinnati 2, O.
Livingstone Engineering Co., 100 Grove St., Worcester 5, Mass.
Locke Regulator Co., Walter and Osborne Sts., Salem, Mass.
Lockformer Co., The, 4615 W. Roosevelt Rd., Chicago 50, Ill.
Lockjoint Wood Products Co., 1114 S. Sante Fe, Wichita 11, Kan.
Locknut Corp. of America, 3403 W. 47th St., Chicago 32, Ill.
Lockport Cotton Batting Co., Lockport, N. Y.
Logan Engineering Co., Lawrence & Lamon Ave., Chicago 30, Ill.
Lonergan Co., J. E., 2nd and Race Sts., Philadelphia 6, Pa.
Long Mfg., Div. Borg-Warner Corp., 12501 Dequindre St., Detroit, Mich.
Lookout Boiler & Mfg. Co., Compress St. & Mfrs. Rd., Chattanooga 1, Tenn.
Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.
Louisville Drying Machine Div., General American Transportation Corp., Hoffman Bldg., 4th & Market Sts., Louisville, Ky.
Louvra Corp., The, 1010 Jeanette Ave., Union, N. J.
Lovejoy Flexible Coupling Co., 5081 W. Lake St., Chicago 44, Ill.
Lowell Wrench Co., 54 Commercial St., Worcester 8, Mass.
Loyal Knight Stokers, Inc., 800 Scheel St., Belleville, Ill.
Ludlow Valve Mfg. Co., Inc., Foot of Adams St., Troy, N. Y.
Lufkin Rule Co., Saginaw, Mich.
Lukens Steel Co. and Divisions, 308 S. First Ave., Coatesville, Pa.
Lumm Co., A. H., 2512 Albion St., Toledo 6, O.

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Lumsden & Van Stone, Div. of Midwest Piping & Supply Co., 436 First St., South Boston 27, Mass.
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati 14, O.
Lustra Corp. of America, 36 Washington St., Brooklyn, N. Y.
Luzerne Rubber Co., Muirhead Ave., Trenton 9, N. J.
Lynch Mfg. Corp., 3600 Summit St., Toledo 1, O.
Lynchburg Foundry Co., Peoples Bank Bldg., Lynchburg, Va.
Lyon, Conklin & Co., Inc., McComas & Race Sts., Baltimore 30, Md.

M

M B Mfg. Co., Inc., The, 1060 State St., New Haven 11, Conn.
M-M-A, Inc., Wabank Rd., Lancaster, Pa.
Maas & Waldstein Co., 438 Riverside Ave., Newark 4, N. J.
MacDermid Chemical Co., Box 1041, Bristol, Conn.
Macksons Co., 125 Cedar St., New York 6, N. Y.
Madden & Co., P. E., 1543 Morse Ave., Chicago, Ill.
Madden Brass Products Co., The, 1111 N. Franklin St., Chicago 10, Ill.
Mac-Lean-Fogg Lock Nut Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
MaGirl Foundry & Furnace Co., 413 E. Oakland Ave., Bloomington, Ill.
Magnetrol, Inc., 2110 S. Marshall Blvd., Chicago 23, Ill.
MagniLastic Div., Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.
Magnode Products, Inc., Box 292, Trenton, O.
Magnus Chemical Co., South Ave., Garwood, N. J.
Mahon Co., R. C., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., 1728 Second St. N., Minneapolis 11, Minn.
●Maid-O'-Mist, Inc., 3217 N. Pulaski Rd., Chicago 41, Ill.
Maintenance Engineering Corp., 3611 Clinton Dr., Houston, Tex.
Majot Automatic Machine Co., Inc., 88 Main St., East Orange, N. J.
Mall Tool Co., 7740 South Chicago Ave., Chicago 19, Ill.
Malleable Iron Fittings Co., Branford, Conn.
Mallory Sales Co., 13904 Lincoln Ave., Dolton, Ill.
Manhattan Perforated Metal Co., Inc., 43-17 37th St., Long Island City 1, N. Y.
Manheim Mfg. & Belting Co., Manheim, Pa.
Manitowoc Engineering Wks., 16th & The River, Manitowoc, Wis.
Manning, Maxwell & Moore, Inc., 250 East Main St., Stratford, Conn.
Mansfield & Green, 1051 Power Ave., Cleveland 14, O.
Manufacturers Machine Co., Railroad Ave., North Andover, Mass.
Maplewood Machinery Co., Inc., 2634 Fullerton Ave., Chicago 47, Ill.
Marathon Electric Mfg. Corp., Cherry and Randolph Sts., P. O. Box 630, Wausau, Wis.
Marble-Card Electric Co., Gladstone, Mich.
Marco Co., Inc., 3rd & Church Sts., Wilmington 50, Del.
Marine & Industrial Products Co., 3731 Filbert St., Philadelphia 4, Pa.
Marion Machine Foundry & Supply Co., Marion, Ind.
●Marley Co., Inc., The, 222 West Gregory Blvd., Kansas City 5, Mo.
Marlin-Rockwell Corp., Jamestown, N. Y.
●Marlo Coil Co., 6135 Manchester Rd., St. Louis 10, Mo.
Marlow Pumps, Ridgewood, N. J.
Marman Products Co., Inc., 940 W. Florence Ave., Inglewood, Calif
Marquette Mfg. Co., 401 Johnson St., Minneapolis, Minn.
●Marsh Corp., Jas. P., 3501 Howard St., Skokie, Ill.
Marsh Valve Co., 4th St., & Brigham Rd., Dunkirk, N. Y.
Marshalltown Mfg. Co., 901 E. Nevada, Marshalltown, Ia.
Martens & Stormoen, 15 Hathaway St., Boston 10, Mass.
Martin Co., Inc., J. O., 637 Minna St., San Francisco 3, Calif.
Martin Fan & Blower Co., 4634 W. 21st Pl., Chicago 50, Ill.
Martin & Sons, H. P., 801 W. 12th St., Owensboro, Ky.
Martin Metal Products Corp., Ferndale, Mich.
Martin-Quaid Co., 1815 W. Sedgley Ave., Philadelphia 32, Pa.
Martocello & Co., Jos. A., 229 N. 13th St., Philadelphia 7, Pa.
Marvel Engineering Co., 625 W. Jackson Blvd., Chicago, Ill.
Masonite Corp., 111 W. Washington St., Chicago 2, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston 24, Mass.
Mass Co., 1123 W. 4½ St., Davenport, Ia.
Master Control Co., 3291 Manchester Rd., Akron, O.
Master Craft Products, 95-01 150th St., Jamaica 4, N. Y.
Master Electric Co., 126 Davis Ave., Dayton 1, O.
Master Mechanics Co., 2097 Columbus, Cleveland, O.
Matthiessen & Hegeler Zinc Co., 9th & Sterling Sts., La Salle, Ill.
Maurath, Inc., 21800 Miles Ave., Cleveland 22, O.
Maurey Mfg. Corp., 2911 S. Wabash Ave., Chicago 16, Ill.
May Oil Burner Div., Gerotor May Corp., Maryland Ave. and Oliver, Baltimore 3, Md.
Mayne Products Co., 324 Harries Bldg., Dayton 2, O.
Mayson Mfg. Co., 4332 Horatio St., Detroit 10, Mich.
Maysteel Products, Inc., 740 N. Plankinton, Milwaukee 3, Wis.
McAlear Mfg. Co., 1921 S. Western Ave., Chicago 8, Ill.
McAuley Trap Co., 104 First Ave., Pittsburgh 22, Pa.
●McCord Corp., 2587 E. Grand Blvd., Detroit 11, Mich.
McCorkle Co., D. H., 6th & Bancroft Way, Berkeley 2, Calif.
●McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Ill.
McIntire Connector Co., 263 Jefferson St., Newark 5, N. J.
McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.
McLarty Systems, 205 W. Michigan Ave., Battle Creek, Mich.
McLeod & Henry Co., Inc., Troy, N. Y.
McNeill Engineering Co., 4057 W. Van Buren St., Chicago 24, Ill.
McPherson Furnace & Supply Co., 1805 N. E. Second Ave., Portland 12, Ore.
●McQuay, Inc., 1600 Broadway, N. E., Minneapolis 13, Minn.
McQuay-Norris Mfg. Co., Southwest Ave. at Marconi, St. Louis 10, Mo.
McRae Valve Co., 620 S. Main St., Los Angeles, Calif.
McRay Products Co., 950 Mission St., South Pasadena 1, Calif.
McWane Cast Iron Pipe Co., 1201 Vanderbilt Rd., Birmingham 2, Ala.
Mears-Kane-Ofeldt, Inc., P.O. Box 223, Bridgeport, Pa.
Mechanical Industries Production Co., 217-223 Ash St., Akron 3, O.
Mechanical Products Corp., 168 N. Ogden Ave., Chicago 7, Ill.
Meco, Inc., 4101 S. E. 26th Ave., Portland 2, Ore.
Medart Co., 100 Potomac St., St. Louis 18, Mo.
Meier Electric & Machine Co., Inc., 3525 E. Washington St., Indianapolis 7, Ind.
Mel-Gauge Co., Crest Ave., East Haven, Conn.
Mel Products Co., The, 554 Chapel St., New Haven, Conn.
Mellish & Murray Co., 1715 Carroll Ave., Chicago 12, Ill.
Merchant & Evans Co., 2035 Washington Ave., Philadelphia 46, Pa.
●Mercoid Corp., The, 4201 Belmont Ave., Chicago 41, Ill.
Mercontrol Inc., 278 Pearl St., New York 7, N. Y.
Mercury Clutch Div., Automatic Steel Products, Inc., Canton 6, O.
Meriam Instrument Co., The, 10920 Madison Ave., Cleveland 2, O.
Mesker Steel Corp., Geo. L., 400 N. W. First St., Evansville 8, Ind.
Metal Carrier Corp., Grand Rapids, Mich.
Metalcraft Inc., Mason City, Ia.
Metal & Thermit Corp., 100 E. 42nd St., New York 17, N. Y.
Metallo Gasket Co., 16 Bethany St., New Brunswick, N. J.
Metropolitan Refining Co., Inc., 50-23 Twenty-Third St., Long Island City 1, N. Y.
●Mettler Co., Inc., The, 4366 Worth St., Los Angeles 16, Calif.
Meyer & Bro. Co., F., 308 S. Commercial St., Peoria 2, Ill.
Meyer Furnace Co., The, P. O. Box 989, Peoria 1, Ill.
Meyer Mfg. Co., 2536 Fourteenth St., Detroit 16, Mich.
Meyer & Wenthe, Inc., 30 S. Jefferson St., Chicago, Ill.
Michigan Pipe Co., 506 Phoenix Bldg., Bay City, Mich.
Micro Metallic Corp., 30 Sea Cliff Ave., Glen Cove, N. Y.
Micro Products Co., 20 N. Wacker Dr., Chicago 6, Ill.
Micro Switch Div. of Minneapolis-Honeywell Regulator Co., 1 E. Spring St., Freeport, Ill.
Midco Register Corp., 1059 Grand Ave., St. Paul, Minn.
Mid-Continent Metal Products Co., 1960 Clybourn Ave., Chicago 14, Ill.
Midland Paint & Varnish Co., 3802 E. 91st St., Cleveland 5, O.
Mid-States Welder Mfg. Co., 6025 S. Ashland Ave., Chicago 36, Ill.
Midwest Automatic Control Co., 510 Third St., Des Moines, Ia.
●Midwest Piping & Supply Co., Inc., 1415 S. Second St., St. Louis 4, Mo.
Midwest Products Co., Port Byron, Ill.
Miller Electric Mfg. Co., Inc., 718 S. Bounds St., Appleton, Wis.
Miller-Harris Instrument Co., 601 E. Ogden Ave., Milwaukee 2, Wis.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Mills Corp., Elmer E., 2930 N. Ashland Ave., Chicago 13, Ill.
Mills Industries, Inc., 4100 W. Fullerton Ave., Chicago 39, Ill.
Milton Equipment Co., N. E. Cor. 4th Race St., Philadelphia 6, Pa.
Milton Roy Co., 1371 E. Mermaid Ave., Philadelphia 18, Pa.
Milwaukee Gas Specialty Co., P. O. Box 461, Milwaukee, Wis.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee 7, Wis.
Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.
Mineral Insulation Co., 103rd & Southwest Highway, Chicago Ridge, Ill.
Minerallac Electric Co., 25 N. Peoria St., Chicago 7, Ill.
Minimite Co., 3700 W. Roosevelt Rd., Chicago 24, Ill.
●Minneapolis-Honeywell Regulator Co., 2641 4th Ave., S., Minneapolis 8, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Wayne & Windrim Aves., Philadelphia 44, Pa.
Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul, Minn.
Minn-Kota Foundry & Mfg. Co., P. O. Box 822, Fargo, N. D.
●Miracle Adhesives Corp., 214 E. 53rd St., New York 22, N. Y.
Mir-O-Col Alloy Co., Inc., 312 North Ave., 21, Los Angeles 31, Calif.
Misener Mfg. Co., Inc., 200-8 Walton St., Syracuse 2, N. Y.
Mission Appliance Corp., 12611 Crenshaw Blvd., Hawthorne, Calif.
Mississippi Glass Co., 200 Fifth Ave., New York 10, N. Y.
Mitchell & Co., Inc., W. K., 29th & Ellsworth, Philadelphia 46, Pa.
Mitchell Mfg. Co., 2525 N. Clybourn Ave., Chicago, Ill.
Modern Engineering Co., 3411 Pine Blvd., St. Louis 3, Mo.
●Modine Mfg. Co., 1509 De Koven Ave., Racine, Wis.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill 18, N. Y.
Moeschl-Edwards Corrugating Co., Inc., The, P. O. Box 1115, Cincinnati 1, O.
Monarch Mfg. Works, Inc., 2501 E. Ontario St., Philadelphia 34, Pa.
Monash-Younker Co., Inc., 1315 W. Congress St., Chicago 7, Ill.
Moncrief Furnace Co., P. O. Box 1673, Atlanta 1, Ga.
Monitor Controller Co., The, 51 Hayward St., Boston 84, Mass.
Monogram Products Co., Inc., 731 N. 35th St., Philadelphia 4, Pa.
Monsanto Chemical Co., 1700 S. Second St., St. Louis 4, Mo.
Monsanto Chemical Co., Merimac Div., Everett Sta., Boston 49, Mass.
Montag Stove & Furnace Wks., 2011 N. Columbia Blvd., Portland 3, Ore.
Montgomery Bros., 1122 Howard St., San Francisco, Calif.
Moore Inc., Goodloe E., 2811 N. Vermilion, Danville, Ill.
Moore Co., The, 810 S. Missouri, Marceline, Mo.
Moore Products Co., H and Lycoming Sts., Philadelphia 24, Pa.
Moraine Products Div., General Motors Corp., Dayton 1, O.
Moran Flexible Joint Co., Inc., 217 W. Main St., Louisville, Ky.
Morehead Mfg. Co., 2455 W. Warren Ave., Detroit 8, Mich.
Moreheat Distribution Inc., 5608 Stewart Rd., Cincinnati 27, O.
Morey, Dan, Box 85, Los Angeles 35, Calif.
Morganite, Inc., Carbon Specialties Div., 3304 48th Ave., Long Island City 1, N. Y.

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Morheat Corp., 700 E. Kalamazoo, Lansing, Mich.
Morris Coupling & Clamp Co., 12th and Factory Ave., Elwood City, Pa.
Morris Machine Wks., 50 E. Genesee St., Baldwinsville, N. Y.
Morrison Brothers Co., Dubuque, Ia.
Morrison Products, Inc., E. 168th St. and Waterloo Rd., Cleveland 10, O.
Morse Chain Co., 7601 Central Ave., Detroit 8, Mich.
Morse-Smith-Morse, Inc., 165 Dexter Ave., Watertown 72, Mass.
Mortell Co., J. W., Kankakee, Ill.
Motionair Co., 3319 E. Slauson Blvd., Los Angeles 11, Calif.
Mt. Hawley Mfg. Co., Inc., Mt. Hawley Air Port, Peoria 4, Ill.
Mountain States Equipment Co., 1238 Speer Blvd., Denver 4, Colo.
● Muckle Mfg. Co., Owatonna 3, Minn.
Mueller Brass Co., Port Huron 1, Mich.
Mueller Co., 512 W. Cerro Gordo St., Decatur, Ill.
● Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee 7.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City 1, N. Y.
Multi-Cell Sales Corp., 3420 Nicollet Ave., Minneapolis 8, Minn.
Multiplex Mfg. Co., Berwick, Pa.
● Multi-Vent Div., Pyle-National Co., The, 1373 Kostner Ave., Chicago 51, Ill.
Muncie Gear Wks., Inc., 700 N. Wysor, Muncie, Ind.
Mund Boilers, Inc., 1600 N. Indiana St., Los Angeles 63, Calif.
Mundet Cork Corp., 7101 Tonnelle Ave., North Bergen, N. J.
Mundt & Sons, Charles, 53 Fairmount Ave., Jersey City 4, N. J.
Munn & Steele, Inc., Castle Island Terminal, South Boston, Mass.
Munton Mfg. Co., 9400 Belmont Ave., Franklin Park, Ill.
Muntz T V, Inc., 3150 N. Lincoln, Chicago, Ill.
● Murray Co. of Texas, The, 3200 Canton Ave., Dallas, Tex.
Murray Iron Wks. Co., 1106 Washington St., Burlington, Ia.
Murray Mfg. Co., D. J., 1002-24 Third St., Wausau, Wis.
Myers & Bro. Co., F. E., The, Ashland, O.
Myers Electric Co., Inc., 209 First Ave., Pittsburgh 22, Pa.
● Mystik Adhesive Products Div., Chicago Show Printing Co., 2635 N. Kildaire, Chicago 39, Ill.

N

● Nash Engineering Co., 307 Wilson Ave., South Norwalk, Conn.
Nason Co., Clarkston, Mich.
Nat Corp., 2710 McGee St., Kansas City 8, Mo.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.
National Air Conditioning Inc., Johnstown, Pa.
National Airoil Burner Co., Inc., 1330 E. Sedgley Ave., Philadelphia 34, Pa.
National Aluminate Corp., 6215 W. 66th Pl., Chicago 38, Ill.
National Aniline Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
National Carbon Co., Div. of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
National Cylinder Gas Co., 840 N. Michigan Ave., Chicago 11, Ill.
National Engineering & Mfg. Co., 519 Wyandotte, Kansas City 6, Mo.
National Engineering Products, Inc., Commerce and Savings Bldg., Washington, D. C.
National Gas Equipment Co., Inc., Terrell, Tex.
National Gypsum Co., Delaware Ave., Buffalo, N. Y.
● National Heater Co., 2182 Cleora Ave., St. Paul 4, Minn.
National Lead Co., 111 Broadway, New York 6, N. Y.
National Lock Co., Inc., 1902 Seventh St., Rockford, Ill.
National Metal Fabricators, 2138 S. Sawyer, Chicago 23, Ill.
National Meter Co., 4221 First Ave., Brooklyn 32, N. Y.
National Oil Burner Co. of N. Y. Inc., 614 Bergen St., Brooklyn, N. Y.
National Pipe Bending Co., 122 River St., New Haven 13, Conn.
National Pipe Coatings, Inc., 3480 East Randolph St., Huntington Park, Calif.
National Radiator Co., The, 221 Central Ave., Johnstown, Pa.
National Sheet Metal Works, New York, N. Y.
National Steam Pump Co., 701 W. Johnson St., Upper Sandusky, O.
National Time & Signal Corp., 21800 Wyoming Ave., Detroit 20, Mich.
● National Tube Div., United States Steel Corp., 525 William Penn Place, Pittsburgh 30, Pa.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh 1, Pa.
National Water Lift Inc., Kalamazoo, Mich.
Naugatuck Mfg. Co., Union City, Conn.
Naylor Pipe Co., 1251 E. 92nd St., Chicago 19, Ill.
Nebel Mfg. Co., P. O. Box 3942, Shaker Square Sta., Cleveland 20, O.
Neilson Chemical Co., 6564 Benson Ave., Detroit 7, Mich.
Nelson Chemical Pumps, Box 2235, Casper, Wyo.
Nelson, Herman, Div., American Air Filter Co., Inc., 1824 Third Ave., Moline, Ill.
Nelson Mfg. Co., B. F., 401 Main St., N. E., Minneapolis 13, Minn.
Nelson Stud Welding, Div. of Morton Gregory Corp., Lorain, O.
Neptune Meter Co., 50 W. 50th St., New York 20, N. Y.
● Nesbitt, Inc., John J., State Rd. & Rhawn St., Philadelphia 36, Pa.
Nevinger Mfg. Co., Inc., Greenville, Ill.
New Albany Machine Mfg. Co., E. 10th & Water Sts., New Albany, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
New England Cooling Tower Co., 88 Broad St., Boston 10, Mass.
New Haven Copper Co., Seymour, Conn.
New Jersey Zinc Sales Co., Front & Fletcher Sts., New York 7, N. Y.
New York Air Valve Corp., 1850 Atlantic Ave., Brooklyn 33, N. Y.
● New York Blower Co., 3159 Shields Ave., Chicago 16, Ill.
New York Brass Foundry, 405 Broome St., New York 13, N. Y.
Newark Boiler Regulator Co., Inc., 15 Ward St., Bloomfield, N. J.
Newark Transformer Co., Linden & Park Ave., Linden, N. J.
Newark Wire Cloth Co., 351 Verona Ave., Newark 4, N. J.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
● Newman Co., Inc., I. C., 30 E. 40th St., New York 16, N. Y.
Newport Steel Corp., Rolling Mill Div., Ninth & Lowell Sts., Newport, Ky.
Niagara Blower Co., 405 Lexington Ave., Room 3117, New York 17.
Niagara Industrial Corp., 20 Vesey St., New York 7, N. Y.
Niagara Machine & Tool Wks., 637-697 Northland Ave., Buffalo 11, N. Y.
Nice Ball Bearing Co., 30th and Hunting Park Ave., Philadelphia 40.
● Nicholson & Co., W. H., 178 Oregon St., Wilkes-Barre, Pa.
Nikoh Tube Co., 5000 S. Whipple, Chicago 32, Ill.
Niles Rolling Mill Co., Niles, O.
Noera Mfg. Co., Div. Chase Brass & Copper Co., Waterbury 20, Conn.
Nooter Corp., 1400 S. Second St., St. Louis 4, Mo.
Nordstrom Valve Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.
● Norge Heat Div., Borg-Warner Corp., 672 E. Woodbridge St., Detroit 26.
Norgren Co., C. A., 3400 So. Elati St., Englewood, Colo.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Norman Products Co., Inc., 1150 Chesapeake Ave., Columbus, O.
Norristown Magnesia & Asbestos Co., Washington St., Norristown, Pa.
North American Mogul Products Co., The, Standard Bldg., Cleveland 13, O.
North American Mfg. Co., 4455 E. 71st St., Cleveland 5, O.
North American Philips Co., Inc., 750 S. Fulton Ave., Mt. Vernon, N. Y.
North Penn Co., 38 E. 21st St., New York 10, N. Y.
Northern Blower Co., 6428 Barberton Ave., Cleveland 2, O.
Northern Equipment Div., Continental Foundry & Machine Co., 1945 Grove Drive, Erie 2, Pa.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Northern Steel & Stoker Corp., 3100 Prospect Rd., Peoria 4, Ill.
Northwest Heating, Inc., 1944 N. Lombard, Portland 3, Ore.
Northwest Lead Co., 2700 16th Ave., S. W., Seattle 4, Wash.
Norwalk Valve Co., South Norwalk, Conn.
Norwood Associated Engineers Inc., 904 Columbus Ave., Springfield, Mass.
Nutmeg Chemical Co., 134 Haven St., New Haven, Conn.
Nu-Way Corp., The, 2416 4th Ave., Rock Island, Ill.
Nye Tool Co., 4120-30 Fullerton Ave., Chicago 39, Ill.

O

OPW Corp., 2735 Colerain Ave., Cincinnati 25, O.
Oakite Products, Inc., 22 Thames St., New York 6, N. Y.
Obear & Son, W. F., 6075 So. Normandie, Los Angeles 44, Calif.
Oberdorfer Foundries, Inc., 3007 Thompson Rd., Syracuse, N. Y.
O'Brien Corp., The, South Bend 21, Ind.
O'Brien Industries, P.O. Box 72, Caldwell, N. J.
O'Brien Steam Specialty Co., Inc., 205 Harrison St., Syracuse 2, N. Y.
Octagon Ventilator Co., 5828-30 S. Oakley Ave., Chicago 36, Ill.
Ohio Brass Co., 380 N. Main St., Mansfield, O.
Ohio Electric Mfg. Co., 5925 Maurice Ave., Cleveland 4, O.
Ohio Foundry & Mfg. Co., Penn R. R. & Slack St., Steubenville, O.
● Ohio Injector Co., 275 Main St., Wadsworth, O.
Ohio Pipe Bending & Machine Co., 3900-3910 Trent Ave., Cleveland 9, O.
Ohio Valley Hardware & Roofing Co., Evansville, Ind.
Ohl & Son, George A., 159 Oraton St., Newark, N. J.
Ohmlac Paint & Refining Co., Inc., 92 Liberty St., New York 6, N. Y.
Oil Equipment Mfg. Corp., 75 Brewster St., New Haven, Conn.
● Oil Heat Institute of America, 6 E. 39th St., New York 16, N. Y.
Olsen Testing Machine Co., Tinius, Easton Rd., Willow Grove, Pa.
● Olson & Co., Arthur A., Broad St., Canfield, O.
O'Neil-Irwin Mfg. Co., 800 Jefferson, Lake City, Minn.
Orangeburg Mfg. Co., Orangeburg, N. Y.
Ormsby-Osterman, Inc., 3631 Cass Ave., St. Louis 13, Mo.
● Orr & Sembower, Inc., Box 1138, Reading, Pa.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Oster Mfg. Co., 2057 E. 61st Pl., Cleveland 3, O.
Ostlind Valve, Inc., 601 N. E. 28th Ave., Portland 12, Ore.
OverHead Heaters, Inc., 1354 Book Bldg., Detroit 26, Mich.
OverSpred Stoker Co., 77 Washington St., Suite 1702, Chicago 2, Ill.
● Owens-Corning Fiberglas Corp., 1911 Nicholas Bldg., Toledo 1, O.
Owens & Co., Inc., Henry, 51 Washington Ave., Cranston 7, R. I.
Oxygen Equipment & Service Co., 8335 S. Halsted St., Chicago 20.
Ozalid Div. of General Aniline & Film Corp., 1505 Ansco Rd., Johnson City, N. Y.
Ozone Air Co., 1132 Division Ave., S., Grand Rapids 7, Mich.

P

Paasche Airbrush Co., 1909 Diversey Parkway, Chicago 14, Ill.
Pabco Products Inc., 475 Brannan St., San Francisco 19, Calif.
Pacific Lumber Co., The, 100 Bush St., San Francisco 4, Calif.
Pacific Machine & Iron Wks., Day Island Waterway, Tacoma, Wash.
Pacific Mfg. Co., 7500 Stanton Ave., Cleveland 4, O.
Pacific Pumping Co., 9201 San Leandro Blvd., Oakland, Calif.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco.
Pacific Steel Boiler Div., United States Radiator Corp., 300 Buhl Bldg., Detroit 31, Mich.

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Pacific Transducer Co., 11921 W. Pico Blvd., Los Angeles 64, Calif.
Pacific Tube Co., 5710 Smithway St., Los Angeles 22, Calif.
Packless Metal Products Corp., 31 Winthrop Ave., New Rochelle, N. Y.
Paddock Engineering Co. of Texas, 2607 Cedar Springs, Dallas, Tex.
Page Steel & Wire, Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Paine Co., 2951 W. Carroll Ave., Chicago 12, Ill.
Pains Fireworks Display Co., Inc., 11 Park Pl., New York 7, N. Y.
Palmer Electric Co., 20 Sproat St., Detroit 1, Mich.
Palmer Mfg. Corp., 2200 W. Filmore St., Phoenix, Ariz.
Palmer Thermometers, Inc., 2501 Norwood Ave., Cincinnati (Norwood) 12, O.
Palnut Co., 106 Cordier St., Irvington, N. J.
Panelyte Div., St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.
Pangborn Corp., 400 Pangborn Blvd., Hagerstown, Md.
Pan-L-Heat Corp., 2838 N. E. Columbia Blvd., Portland 11, Ore.
Paragon Electric Co., 1600 Twelfth St., Two Rivers, Wis.
Paragon-Revolute Corp., 61 South Ave., Rochester 4, N. Y.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland 12, O.
Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.
Parks-Cramer Co., P. O. Box 444, Fitchburg, Mass.
Patrol Valve Co., The, 2310 E. Superior Ave., Cleveland 14, O.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Patterson-Ballagh Corp., 1900 E. 65th St., Los Angeles, Calif.
●Patterson-Kelley Co., Inc., The, 107 Warren St., East Stroudsburg, Pa.
Paul-Lewis Laboratories, Inc., 4253 N. Port Washington Rd., Milwaukee 12, Wis.
Paul Valve Corp., 683 Third Ave., New York 17, N. Y.
Payne Furnace Div., Affiliated Gas Equipment, Inc., 801 Royal Oaks Ave., Monrovia, Calif.
Peabody Engineering Corp., 580 Fifth Ave., New York 19, N. Y.
Pease Co., C. F., The, 2601 W. Irving Park Rd., Chicago 18, Ill.
Peck & Harvey, 5736 N. Western Ave., Chicago 45, Ill.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.
Pecora Paint Co., Inc., 4th St., and Penna. R. R., Philadelphia 40, Pa.
Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.
Peer, Inc., 1440 Milton St., Benton Harbor, Mich.
Peerless of America, Inc., 2901 Lawrence Ave., Chicago 25, Ill.
Peerless Electric Co., 1401 W. Market St., Warren, O.
Peerless Heater Div., The Eastern Foundry Co., Boyertown, Pa.
Peerless Pump Div., Food Machinery & Chemical Corp., 301 West Ave., 26, Los Angeles 31, Calif.
Peerless Unit Ventilation Co., Inc., 810 Union Ave., Bridgeport, Conn.
Penberthy Injector Co., Div. of Buffalo Eclipse Corp., 1242 Holden Ave., Detroit 2, Mich.
Penn Brass & Copper Co., 3800 W. 20th St., Erie, Pa.
●Penn Controls, Inc., P. O. Box 556, Goshen, Ind.
Penn Galvanizing Co., 2201 E. Tioga St., Philadelphia 34, Pa.
Penn Industrial Instrument Corp., 4110 Haverford Ave., Philadelphia 4, Pa.
Penn Mfg. Corp. of Washington, Pa., 380 W. Chestnut St., P. O. Box 484, Washington, Pa.
●Penn Ventilator Co., Goodman above Allegheny Ave., Philadelphia 40, Pa.
Pennsylvania Engineering Wks., 526 S. Jefferson St., New Castle, Pa.
Pennsylvania Flexible Metallic Tubing Co., 72nd St. & Powers Lane, Philadelphia 42, Pa.
Pennsylvania Forge Co., Milnor & Bleigh Sts., Philadelphia, Pa.
Pennsylvania Furnace & Iron Co., Warren, Pa.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia 7, Pa.
% Proportioneers, Inc. %, 381 Harris Ave., Providence 1, R. I.
Perfect Circle Corp., Hagerstown, Md.
Perfection Grate & Stoker Co., 4 Fisk Ave., Springfield 7, Mass.
Perfection Refrigeration Parts Co., Harvey, Ill.
●Perfex Corp., 500 W. Oklahoma Ave., Milwaukee 7, Wis.
Perkins Machine Co., 4 Perkins Ave., Warren, Mass.
Perkins & Son, Inc., B. F., Chicopee St., Holyoke, Mass.
Permatex Co., Inc., 1716-1720 Avenue Y, Brooklyn 35, N. Y.
Permutit Co., 330 W. 42nd St., New York 18, N. Y.
Perolin Co., Inc., 1112 W. 37th St., Chicago 9, Ill.
Peters-Dalton, Inc., 17900 Ryan Rd., Detroit 12, Mich.
Peterson Co., B. A., 300 W. R. R. Ave., Dowagiac, Mich.
Petroleum Heat & Power Co., Stamford, Conn.
Petrometer Corp., 43-22 Tenth St., Long Island City 1, N. Y.
Pfening Co., Fred D., The, 1075 W. 5th Ave., Columbus 8, O.
Phelps Dodge Copper Products Corp., British American Tube Div., 40 Wall St., New York 5, N. Y.
Phelps Mfg. Co., 715 Thomas St., Little Rock, Ark.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Philadelphia Pipe Bending Co., 4135-65 N. Fifth St., Philadelphia 40, Pa.
Philadelphia Thermometer Co., 6th & Cayuga St., Philadelphia 40, Pa.
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.
Phillips & Co., H. A., 3255 W. Carroll Ave., Chicago 24, Ill.
●Phillips Cooling Tower Co., Inc., 220 Dupont St., Brooklyn 22, N. Y.
Phoenix Brass Fittings Corp., Coit St. & Chancellor Ave., Irvington 11, N. J.
Phoenix Mfg. Co., Joliet, Ill.
Phoenix Ventilator Co., Inc., 1665 63rd St., Brooklyn, N. Y.
Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.
Photovolt Corp., 95 Madison Ave., New York 16, N. Y.
Pick Mfg. Co., West Bend, Wis.
Pierce Co., Wm. B., The, 277 Military Rd., Buffalo 7, N. Y.
Piezo Mfg. Corp., 110 E. 42nd St., New York 17, N. Y.
Pilley Brush Co., Fort Madison, Ia.
Pines Engineering Co., Inc., 601 Walnut St., Aurora, Ill.
Pioneer Pump & Mfg. Co., 19679 John R. St., Detroit 3, Mich.
Pioneer Roofing & Sheet Metal Co., 226 N. Main St., Muskogee, Okla.
Pioneer Tool Co., 1103 Wisconsin Ave., Racine, Wis.
Piping Specialties, Inc., 114 Liberty St., New York 6, N. Y.
Piston Ring Div., Koppers Co., Inc., Bush & Hamburg Sts., Baltimore 3, Md.
Pittsburgh Brass Mfg. Co., 3155 Penn Ave., Pittsburgh, Pa.
Pittsburgh Chemical Laboratories, Inc., 405 Penn Ave., Pittsburgh, Pa.
Pittsburgh Corning Corp., 307 4th Ave., Pittsburgh, Pa.
Pittsburgh Lectrodryer Corp., 327 32nd St., Pittsburgh 30, Pa.
Pittsburgh Pipe Coil & Bending Co., 61 Bridge St., Etna Pittsburgh 23, Pa.
Pittsburgh Piping & Equipment Co., 10 43rd St., Pittsburgh 1, Pa.
Pittsburgh Plate Glass Co., 2000 Grant Bldg., Pittsburgh 19, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Pittsburgh Tube Co., 212 Wood St., Pittsburgh 22, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Pittsburg Water Heater Co., Box 4452, Pittsburgh 5, Pa.
Plasteel Products Co., McAdams Ave., Washington, Pa.
Plastergon Wall Board Co., Philadelphia Ave., Buffalo 7, N. Y.
Plastic Products Co., 6475 Georgia Ave., Detroit 11, Mich.
Pleasantaire Corp., 734 15th St., Washington 5, D. C.
Plibrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago 14, Ill.
Plumb Mfg. Co., 1925 Dwyer Ave., Utica 3, N. Y.
Plummer Spray Equipment Co., 700 Filmore St., Napoleon, O.
Plymouth Industries, Inc., 1932 Harrison Ave., Plymouth, Ind.
Poe Co., C. W., The, 10530 Wilbur Ave., Cleveland 6, O.
Pokorney Mfg. Co., 3117 Clybourn Ave., Chicago, Ill.
Polaire Cooler Co., Inc., 141 E. Jackson St., Phoenix, Ariz.
Polo Pump Co., Polo, Ill.
Polyken Industrial Tape Dept., Bauer & Black, Div. of the Kendall Co., 222 W. Adams St., Chicago 6, Ill.
Poole Foundry & Machine Co., 1700 Union Ave., Woodberry, Baltimore 11, Md.
Portable Electric Tools, Inc., 320 W. 83rd St., Chicago 20, Ill.
●Porter & Co., Inc., H. W., 825 Frelinghuysen Ave., Newark 5, N. J.
Positive Control Co., The, 2818 Spring Grove Ave., Cincinnati 25, O.
Potter & Brumfield Sales Co., Princeton, Ind.
Potts Co., Horace T., Erie Ave. & "D" St., Philadelphia 34, Pa.
Powder Power Tool Corp., 0719 S. W. Woods, Portland 1, Ore.
Powder Weld Process Co., The, 419 Kent Ave., Brooklyn, N. Y.
Power Engineering Co., 205 West Wacker Dr., Chicago 6, Ill.
●Powell Co., Wm., The, 2525 Spring Grove Ave., Cincinnati 22, O.
●Power Piping Div., Blaw Knox Construction Co., 829 Beaver Ave., Pittsburgh 33, Pa.
●Powers Regulator Co., 3400 Oakton St., Skokie, Ill.
Prat-Daniel Corp., 2 Meadow St., South Norwalk, Conn.
Precision Products, Inc., 516 S. Lansing, Tulsa, Okla.
Precision Scientific Co., 3737 Cortland St., Chicago 47, Ill.
Precision Thermometer & Instrument Co., 1506 Brandywine St., Philadelphia 30, Pa.
Precision Welder & Machine Co., 138 E. McMicken Ave., Cincinnati 10, O.
Preferred Utilities Mfg. Corp., 1860 Broadway, New York 23, N. Y.
Presstite Engineering Co., 3900 Chouteau St., St. Louis 10, Mo.
Pressure Products Corp., 140 N. Dearborn St., Chicago 2, Ill.
●Pritchard & Co., J. F., Equipment Div., 908 Grand Ave., Kansas City 6, Mo.
Proctor & Schwartz, Inc., 7th St. and Tabor Rd., Philadelphia 20, Pa.
Products Research Co., 5426 San Fernando Rd., Glendale 3, Calif.
Propellair Div., Robbins & Myers Inc., 1345 Aitken Blvd., Springfield, O.
Proved Products Mfg. Co., Drawer 1190, San Fernando, Calif.
Prox Co., Inc., Frank, 1201 S. First St., Terre Haute, Ind.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis 20, Mo.
Pur Air Div., American Solvent Recovery Corp., 8th & Cassady Aves., Columbus 3, O.
Pure Carbonic, Inc., Div. of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N. Y.
Pyle-National Co., The, 1373 N. Kostner Ave., Chicago 51, Ill.
Pyott Foundry & Machine Co., 328 N. Sangamon St., Chicago 7, Ill.
Pypon Co., 410 Frick Bldg., Pittsburgh 22, Pa.
Pyrolite Products Co., 1221-1231 W. 74th St., Cleveland 2, O.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.

Q

Q-P Mfg. Co., Needham Heights, Mass.
Quaker City Iron Wks., Allegheny & Tulip St., Philadelphia 34, Pa.
Quaker Rubber Corp., Div. H. K. Porter Co., Inc., Comly & Milnor Sts., Philadelphia 24, Pa.
Quality Specialty Co., Inc., 211 N. 2nd St., Philadelphia 6, Pa.
Quickwork Div., Whiting Corp., Harvey, Ill.
Quiet Automatic Oil Burner Corp., 33 Bloomfield Ave., Newark 4, N. J.
Quigley Co., Inc., 527 Fifth Ave., New York 17, N. Y.
Quijada Tool Co., Inc., 5474-78 Alhambra Ave., Los Angeles 32, Calif.

R

R C S Tool Sales Corp., P. O. Box 1434, Joliet, Ill.
R-S Products Corp., 4600 Germantown Ave., Philadelphia 44, Pa.
Radiant Devices, 4030 Chouteau Ave., St. Louis, Mo.
Radiant Heat Engineering, Inc., 1289 N. Fair Oaks, Pasadena 3, Calif.

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Radiant Panel Mfg. Co., 9 E. Pearl St., Torrington, Conn.
Radiant-Ray Radiation, Inc., New Britain, Conn.
Radiant Utilities Corp., 8817-18th Ave., Brooklyn 14, N. Y.
Radiator Specialty Co., 1700-1900 Dowd Rd., Charlotte 1, N. C.
Radiator Valve Co. of America, 428 S. 52nd St., Philadelphia 43, Pa.
Radioactive Products, Inc., 443 W. Congress St., Detroit 26, Mich.
Raisler Corp., Grimes Sprinkler Div., 129 Amsterdam Ave., New York 23, N. Y.
Ramset Fasteners, Inc., 12117 Berea Rd., Cleveland 11, O.
Ramsey Chain Co., Inc., 1029 Broadway, Albany 1, N. Y.
Ramtite Co., The, 2563 W. 18th St., Chicago 8, Ill.
Ranco, Inc., 601 W. 5th Ave., Columbus 1, O.
Randall Graphite Bearings, Inc., 1000 S. Greenlawn Ave., Lima, O.
Ravena Iron Co., Ravena, N. Y.
Rawplug Co., Inc., The, 271 Church St., New York 13, N. Y.
● Ray Oil Burner Co., 1301 San Jose Ave., San Francisco 12, Calif.
Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.
Rayfield Co., C. L., 2010-18 S. Halsted St., Chicago 8, Ill.
Raymond Pulverizer Div., Combustion Engineering-Superheater, Inc., 1324 N. Branch St., Chicago, Ill.
R-P & C Div., American Chain & Cable Co., Inc., Reading, Pa.
Read Standard Corp., Blower-Stoker Div., Erie, Pa.
Reading Tube Corp., 36-12 47th Ave., Long Island City, N. Y.
Ready-Power Co., The, 11231 Freud Ave., Detroit 14, Mich.
Reco Products Div., Refrigeration Engineering Corp., 2020 Naudain St., Philadelphia, Pa.
Red Jacket Mfg. Co., Davenport, Ia.
Red Spot Electric Co., 7405 S. Tacoma Way, Tacoma 9, Wash.
Redmond Co., Inc., Owosso, Mich.
Reed Unit-Fans, Inc., 1001 St. Charles Ave., New Orleans 8, La.
Reeves Pully Co., H. P., Columbus, Ind.
Reflectal Corp., 155 E. 44th St., New York 17, N. Y.
● Refinite Corp., P. O. Box 1312, Omaha 8, Neb.
Refractory & Insulation Corp., 120 Wall St., New York 5, N. Y.
Refrigeration Appliances, Inc., 917-923 W. Lake St., Chicago, Ill.
Refrigeration Economics Co., Inc., 1231 Tuscarawas E., Canton 2, O.
Refrigeration Engineering Inc., 7250 E. Slauson Ave., Los Angeles 22, Calif.
Rega Mfg. Co., 79 Mt. Hope Ave., Rochester 20, N. Y.
● Register & Grille Mfg. Co., Inc., 70 Berry St., Brooklyn 11, N. Y.
Reichert Float & Mfg. Co., 2238 Smead Ave., Toledo 6, O.
Reif-Rexoil, Inc., 37-41 Carroll St., Buffalo 3, N. Y.
Reilly Tar & Chemical Corp., 1615 Merchants Bank Bldg., Indianapolis 4, Ind.
Reiner & Campbell Co., Inc., P. O. Box 5035, Newark 5, N. J.
● Reinhard Brothers Co., 11-17 S. 9th St., Minneapolis 2, Minn.
Reintjes Co., Geo. P., 2517-19 Jefferson St., Kansas City, Mo.
Reliable Metal Engineering Co., 4336-4358 S. Knox, Chicago, Ill.
Reliable Perforating Co., 2047 N. Wood St., Chicago, Ill.
Reliable Products Mfg. Co., 123 De Kalb Ave., Brooklyn, N. Y.
Reliance Automatic Lighting Co., 1929 Mead St., Racine, Wis.
Reliance Electric & Engineering Co., 1058 Ivanhoe Rd., Cleveland 10, O.
Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland 3, O.
Reliance Refrigerating Machine Co., 3401 N. Kedzie Ave., Chicago, Ill.
Remco, Inc., Zelienople, Pa.
Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.
Remington Arms Co., Inc., Bridgeport, Conn.
● Rempe Co., 342 N. Sacramento Blvd., Chicago 12, Ill.
Rensselaer Valve Co., Ontario St., Cohoes, N. Y.
Reps Tool Co., Inc., Box 5, Elmwood Branch, Hartford 10, Conn.
Republic Boiler Corp., 50 W. 50th St., New York, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago 47, Ill.
Republic Products Co., 7420 State Rd., Philadelphia, Pa.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Republic Steel Corp., Republic Bldg., Cleveland 1, O.
Republic Steel Corp., Bolt & Nut Div., 1970 Carter Rd., Cleveland 13.
Republic Steel Corp., Steel & Tubes Div., 224 E. 131st St., Cleveland 8, O.
Research Corp., Chrysler Bldg., New York 17, N. Y.
● Research Products Corp., 1015 E. Washington Ave., Madison 10, Wis.
Resisto Pipe & Valve Co., 262 Bridge St., East Cambridge, Mass.
Resistoflex Corp., Belleville 9, N. J.
Reuland Electric Co., 3001 W. Mission Rd., Alhambra, Calif.
Revcor, 5201 N. Avondale Ave., Chicago 30, Ill.
● Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Rex Clay Products Co., 14414 Dexter Blvd., Detroit, Mich.
Rex Welder & Engineering Co., 409 Southwest Blvd., Kansas City 8, Mo.
Reynolds Electric Co., 3000 River Rd., River Grove, Ill.
Reynolds Mfg. Co., The, Box 333, Comstock Park, Mich.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky.
Reynolds Shaffer Co., Detroit 4, Mich.
Reznor Mfg. Co., Mercer 8, Pa.
Rheem Mfg. Co., 570 Lexington Ave., New York 22, N. Y.
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia 6, Pa.
● Rhode Island Fittings Co., 355 Dexter St., Providence 7, R. I.
Rhode Island Humidifier & Ventilating Co., 99 Chauncy St., Boston 11, Mass.
Rhodes, Inc., M. H., 30 Bartholomew Ave., Hartford, Conn.
Richmond Engineering Co., Inc., 7th and Hospital Sts., Richmond, Va.
Richmond Radiator Co., 19 E. 47th St., New York 17, N. Y.
Richmont, Inc., 808 W. Santa Anita St., San Gabriel, Calif.
Ric-wiL Co., Union Commerce Bldg., Cleveland 14, O.
● Ridge Tool Co., Clark St., Elyria, O.
Rid-Sludge Div., Aulwood Mfg. Co., 77 Raymond Ave., St. Paul, Minn.
Riggin Metal Products, Inc., Box 267, Kankakee, Ill.
Riggio Co., Frank D., 38 Orient Way, Rutherford, N. J.
Rigidbilt Inc., 2850 W. Fulton St., Chicago 12, Ill.
Riley Stoker Corp., 9 Neponset St., Worcester, Mass.
Rinehart Inc., 511-513 Main St., Richmond, Ind.
Ripley Co., Inc., Middleton, Conn.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
● Ritter Pattern & Casting Co., Inc., 232 Canal St., New York 13, N. Y.
Rittling Corp., The, Hamburg, N. Y.
Robbins & Myers, Inc., Lagonda Ave., Springfield, O.
Roberson Co., L. N., 1539 E. 103rd St., Seattle 55, Wash.
Robert Mfg. Co., 9035 Venice Blvd., Los Angeles 34, Calif.
Roberts-Gordon Appliance Corp., 44 Central Ave., Buffalo 6, N. Y.
Roberts Tube Works, 2500 Military Ave., Detroit 9, Mich.
Robertson Co., H. H., 2400 Farmers Bank Bldg., Pittsburgh 22, Pa
Robertson Sons, Inc., M. F., Lansdowne, Pa.
Robinson Aviation, Inc., Teterboro Air Terminal, Teterboro, N. J.
Robinson Clay Product Co., The, 65 W. State St., Akron 9, O.
Robinson Industries, Coleman, Mich.
Rochester Lead Works, Inc., 380 Exchange St., Rochester 8, N. Y.
Rochester Mfg. Co., Inc., 63 Rockwood St., Rochester 10, N. Y.
Rochester Products, Div. of General Motors Corp., Rochester, N. Y.
Rock Fleece Co., 115 Durango St., El Paso, Tex.
Rock Island Register Co., 2435 Fifth Ave., Rock Island, Ill.
Rockford Screw Products Co., 2501 Ninth St., Rockford, Ill.
● Rockwell Co., W. S., 254 Eliot St., Fairfield, Conn.
● Rockwell Mfg. Co., Meter & Valve Div., 400 N. Lexington Ave., Pittsburgh, Pa.
Rockwood Sprinkler Co., 38 Harlow St., Worcester 5, Mass.
Roddick Tool Co., P. O. Box 109, Anaheim, Calif.
Rodwell Engineering & Sales Co., 4303 Dodge St., Omaha, Neb.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg, Pittsburgh 15, Pa.
Roller Bearing Co. of America, Whitehead Rd., Trenton 3, N. J.
● Rome-Turney Radiator Co., Canal St., Rome, N. Y.
Roots-Connersville Blower Corp., 900 W. Mount St., Connersville, Ind.
Roper Corp., Geo. D., Blackhawk Park Ave., Rockford, Ill.
Rosebraugh Co., W. W., 680 S. 17th St., Salem, Ore.
Rosedale Foundry & Machine Co., Columbus & Preble Aves., N. S., Pittsburgh, Pa.
Ross Engineering Corp., J. O., 444 Madison Ave., New York 22, N. Y.
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo 13, N. Y.
Ross Sprinkler Co., 34 Roberts St., Pasadena 3, Calif.
Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, N. Y.
Rotary Concrete Drill Co., 650 S. Arroyo Pkwy., Pasadena, Calif.
Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Calif.
Rotary Seal Co., 2020 N. Larrabee St., Chicago 14, Ill.
● Roth Co., Roy E., 2420-A 24th Ave., Rock Island, Ill.
Roto-Beam, 1755 N. Keeler Ave., Chicago 39, Ill.
Rotometals, Inc., 980 Harrison St., San Francisco 7, Calif.
Rotor Corp., Miamisburg, O.
Royal Heaters, Inc., 1024 Westminster Ave., Alhambra, Calif.
Royal Mfg. Corp., Waterloo, Ind.
Royal Ventilator Co., 415 Locust St., Philadelphia 6, Pa.
Royalton Co., Gasport, N. Y.
Royersford Foundry & Machine Co., Inc., 101-131 Main St., Royersford, Pa.
Roylyn, Inc., 1706 Standard Ave., Glendale 1, Calif.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
● Rubber & Plastics Compound Co., Rockefeller Plaza, New York, N. Y.
Ruberoid Co., 500 Fifth Ave., New York 18, N. Y.
Ruby Chemical Co., 74 McDowell St., Columbus 8, O.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee 12, Wis.
Ruggles-Klingemann Mfg. Co., 110 Tremont St., Boston, Mass.
● Ruppright, Siegfried, Box 6795, Los Angeles 22, Calif.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Russell Co., F. C., The, 1100 Chester Ave., Cleveland 1, O.
Russell Mfg. Co., John M., Box 246, Naugatuck, Conn.
Rust-Oleum Corp., 2425 Oakton St., Evanston, Ill.
Rutland Fire Clay Co., Curtis Ave., Rutland, Vt.
Ruud Mfg. Co., 2934 Smallman St., Pittsburgh 1, Pa.

S

● SKF Industries, Inc., Front St., & Erie Ave., Philadelphia 32, Pa.
S.O.S. Products Co., Inc., 282 Nassau Ave., Brooklyn 22, N. Y.
Sac Tool Mfg. Co., 1913 Washington Ave., St. Louis 3, Mo.
St. Clair Rubber Co., 440 E. Jefferson, Detroit, Mich.
St. Louis Blow Pipe & Heater Co., Inc., 1948 N. 9th St., St. Louis 6.
St. Louis Tool Co., 6100 Prescott St., St. Louis 15, Mo.
St. Paul Corrugating Co., S. Wabasha and Water Sts., St. Paul 1.
Sales & Co., Murray W., 801 W. Baltimore Ave., Detroit 2, Mich.
Salina Metal Products Co., 9th and Bishop, Salina, Kan.
Sall Bros. Co., 2320 Kishwaukee St., Rockford, Ill.
Sall Mountain Co., Box 777, Hamilton, O.
Salsbury Corp., 1161 E. Florence Ave., Los Angeles 1, Calif.
Sampsel Time Control, Inc., Spring Valley, Ill.
San Angelo Foundry & Machine Co., 1000 E. Upton, San Angelo, Tex.
Sandee Mfg. Co., 5050 W. Foster Ave., Chicago, Ill.
Sangamo Electric Co., 1301 N. 11th St., Springfield, Ill.
Santa Fe Tank & Tower Co., 5401 S. Boyle Ave., Los Angeles 11.
Saran Lined Pipe Co., 2415 Burdette Ave., Ferndale 20, Mich.
● Sarco Co., Inc., Empire State Bldg., New York 1, N. Y.
● Sarcotherm Controls, Inc., Empire State Bldg., New York 1, N. Y.
Sauereisen Cements Co., Sharpsburg Station, Pittsburgh 15, Pa.
Saunders Mfg. Co., 25 Atherton St., Yonkers, N. Y.
Saverite Engineering Co., 1030 Willow Ave., Hoboken, N. J.
Scaife Co., 26 Ann St., Oakmont, Pa.

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Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia 33, Pa.
Schaible Co., The, 1086 Summer St., Cincinnati 4, O.
Schatz Mfg. Co., The, Fairview, Poughkeepsie, N. Y.
Schaub Engineering Co., Fred H., 2110 S. Marshall Blvd., Chicago 23, Ill.
Schecter Brothers Co., Hancock and Huntingdon Sts., Philadelphia 33, Pa.
Schieren Co., Chas. A., 30-38 Ferry St., New York 7, N. Y.
Schild Mfg. Co., 4107 N. 15th St., Milwaukee 9, Wis.
Schmieg Industries, 312-320 Piquette Ave., Detroit 2, Mich.
Schnacke, Inc., 1101 N. Governor St., Evansville, Ind.
Schneible Co., Claude B., 2827 25th St., Detroit 16, Mich.
Schramm, Inc., West Chester, Pa.
Schror, Dr. Adolph, 52 Cambridge St., East Orange, N. J.
Schundler & Co., Inc., F. E., 45-15 Vernon Blvd., Long Island City, N. Y.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Schutte & Koerting Co., Cornwells Heights, Bucks County, Pa.
Schwitzer-Cummins Co., 1125 E. 22nd St., Indianapolis 7, Ind.
Sciaky Bros. Inc., 4915 W. 67th St., Chicago 38, Ill.
Scientiae Tool Co., 103 Pine, Dayton 2, O.
Scientific Instrument Co., 1041 Second Ave., Detroit 26, Mich.
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo.
Scott Valve Mfg. Co., 3963 McKinley Ave., Detroit 8, Mich.
Scovill Mfg. Co., Waterville Div., Waterville 14, Conn.
Scully Signal Co., 88 First St., Cambridge 41, Mass.
Sealed Power Corp., 500 Sanford St., Muskegon 61, Mich.
Sealol Corp., 45 Willard Ave., Providence 5, R. I.
Seamless Rubber Co., Industrial Tape Div., 464 Congress Ave., New Haven 3, Conn.
Seamlex Co., Inc., 41-23 24th St., Long Island City 1, N. Y.
Selas Corp. of America, Erie Ave. and D St., Philadelphia 34, Pa.
Sellers Engineering Co., 4874-76 N. Clark St., Chicago 40, Ill.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Semler Co., Jeannette, Pa.
Sensenich Corp., Adjacent to Lancaster Municipal Airport, Lancaster, Pa.
Servel, Inc., Electric Refrigeration Div., 119 Morton Ave., Evansville 20, Ind.
Service To Industry, Box 133, West Hartford, Conn.
Shafer Bearing Corp., 801 Burlington Ave., Downers Grove, Ill.
Shakeproof, Inc., 2501 N. Keeler Ave., Chicago 39, Ill.
Shallcross Co., 48th and Grays Ferry Rd., Philadelphia 43, Pa.
Shallcross Controls, Inc., 2217-21 N. 31st St., Milwaukee 8, Wis.
Shank Co., Cyrus, 625 W. Jackson Blvd., Chicago 6, Ill.
Sharon Steel Corp., Sharon, Pa.
Shaw Co., Benjamin F., Second & Lombard Sts., Wilmington 99, Del.
Shaw-Kendall Engineering Co., 128 S. Superior St., Toledo 4, O.
Shaw-Perkins Mfg. Co., 201 E. Carson St., Pittsburgh 19, Pa.
Sheetlock Co., 4521 N. Clark St., Chicago, Ill.
Sheffler-Gross Co., Drexel Bldg., Philadelphia 6, Pa.
Shell Oil Co., Lubricants Dept., 50 W. 50th St., New York 20, N. Y.
Shephard Heater Co., Inc., 951 Sycamore St., Terre Haute, Ind.
Sherwin-Williams Co., The, 101 Prospect Ave., N. W., Cleveland, O.
●Siemon & Co., 1817-19 Holmes St., Kansas City 8, Mo.
Sight Feed Generator Co., P. O. Box 38, West Alexandria, O.
Signal Electric Mfg. Co., Menominee, Mich.
Signal Indicator Co., 894 Broadway, New York 3, N. Y.
Sikes Co., S. R., 1028 S. Third St., Minneapolis 15, Minn.
Silvercote Products, Inc., 161 E. Erie St., Chicago 11, Ill.
Simplex Ceiling Corp., 552 W. 52nd St., New York 19, N. Y.
Simplex Heating Specialty Co., Inc., 954 Cabell St., Lynchburg, Va.
Simplex Mfg. Co., 198 N. Main St., Fond du Lac, Wis.
Simplex Oil Heating Corp., 11 Park Pl., New York 7, N. Y.
Sims Co., 18th & Whitley Sts., Erie, Pa.
Sinker-Davis Co., 230 S. Missouri St., Indianapolis 4, Ind.
Sioux Steel Co., P. O. Box 898, Sioux Falls, S. D.
Sipe & Co., James B., Box 8010, Pittsburgh 16, Pa.
Skaneateles Mfg. Co., Inc., 122 Dickerson St., Syracuse 2, N. Y.
●Skidmore Corp., St. Joseph, Mich.
Skilbeck Mfg. Co., 7432 27th Ave., Kenosha, Wis.
Skilsaw, Inc., 5033 Elston Ave., Chicago 30, Ill.
Skinner Co., M. B., South Bend 21, Ind.
Skinner Electric Valve Div., 40 Belden Ave., Norwalk, Conn.
Skinner Engine Co., 337 W. 12th St., Erie, Pa.
Skinner Irrigation Co., 121 E. Canal St., Troy, O.
Slant-Fin Radiator Corp., 5113-17 2nd Ave., Brooklyn, N. Y.
Sly Mfg. Co., W. W., 4700 Train Ave., Cleveland 2, O.
Small Motors, Inc., 2076 Elston Ave., Chicago 14, Ill.
●Smith Co., Inc., H. B., The, 64 Main St., Westfield, Mass.
Smith Co., J. B., 3327 B St., Philadelphia 34, Pa.
Smith Control & Instrument Corp., Palmyra, N. J.
Smith Corp., A. O., 3533 N. 27th St., Milwaukee 1, Wis.
Smith Corp., Winfield, H., 144 Eaton St., Springfield, Erie County, N. Y.
Smith Filter Corp., 1603-2 Ave., Moline, Ill.
Smith & Kanzler Corp., E. Linden Ave., Linden, N. J.
Smith-Raymond Co., 1231-33 Tenth Ave., Columbus, Ga.
Smith & Serrell, Inc., 200 Washington St., Newark 2, N. J.
Smith Twin Tubular Boiler Co., Inc., Cottman St., at State Rd., Philadelphia 35, Pa.
Smith Welding Equipment Corp., 2633 S. E. Fourth St., Minneapolis 14, Minn.
Smolensky Valve Co., Inc., 940 Broadway, Bedford, O.
Smooth-On Mfg. Co., 568-574 Communipaw Ave., Jersey City 4, N. J.
Snap-on Tools Corp., Kenosha, Wis.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York 4, N. Y.
Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.
Soldering Specialties Co., Summit, N. J.
Solvay Sales Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit 8, Mich.
Somerville Iron Wks., Somerville, N. J.
Scnneborn Sons, Inc., L., 88 Lexington Ave., New York 16, N. Y.
Sonner Burner Co., 412-420 E. 6th Ave., Winfield, Kans.
Sonoco Products Co., Hartsville, S.C.
Soreng Mfg. Co., 9551 Eden Ave., Schiller Park, Ill.
●South Bend Air Products, Inc., 322 E. Colfax Ave., South Bend 22, Ind.
South Chester Corp., Southco Div., Lester, Pa.
South Chester Tube Co., Front & Thurlow Sts., P. O. Box 60, Chester, Pa.
Southbridge Roofing Co., Inc., Hartwell and Chapin St., Southbridge, Mass.
Souther Iron Co., E. E., 1952 Kienlen Ave., St. Louis 20, Mo.
Southern States Iron Roofing Co., Stiles Ave. & Louisville Rd., Savannah, Ga.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
●Spang-Chalfant, Div. of National Supply Co., Grant Bldg., Pittsburgh 30, Pa.
Spartan Tool Co., 1918 Columbia Ave., Chicago 26, Ill.
Special Chemicals Corp., 30 Irving Pl., New York 3, N. Y.
Speed Selector Inc., 118 Noble Court, Cleveland 13, O.
Speedway Mfg. Co., 1834 S. 52nd Ave., Chicago (Cicero), Ill.
●Spence Engineering Co. Inc., 32 Grant St., Walden 6, N. Y.
●Spencer Heater, Lycoming-Spencer Div., Avco Mfg. Corp., Williamsport, Pa.
Spencer Thermostat Div., Metals & Controls Corp., 34 Forest St., Attleboro, Mass.
Spencer Turbine Co., 486 New Park Ave., Hartford 6, Conn.
Sponge Rubber Products Co., Shelton, Conn.
●Sporlan Valve Co., 7525 Sussex Ave., St. Louis 17, Mo.
Spray Engineering Co., 114 Central St., Somerville 45, Mass.
●Spraying Systems Co., 3219 Randolph St., Bellwood, Ill.
Sprayo-Flake Co., 2715 Irving Park Blvd., Chicago 18, Ill.
Springfield Boiler Co., 1939 E. Capitol Ave., Springfield, Ill.
Sprout-Waldron & Co., Muncy, Pa.
Square D Co., 6060 Rivard St., Detroit 11, Mich.
Square D Co., Industrial Controller Div., 4041 N. Richards St., Milwaukee 12, Wis.
Squires Co., C. E., The, 18502 Syracuse Ave., Cleveland 10, O.
Stamco Inc., New Bremen, O.
Stanat Mfg. Co., 47-28 37th St., Long Island City 1, N. Y.
Standard Asbestos Mfg. Co., 860 W. Evergreen Ave., Chicago 22, Ill.
Standard Electric Mfg. Co., West Berlin, N. J.
Standard Engineering Wks., 289 Roosevelt Ave., Pawtucket, R. I.
Standard Fuel Engineering Co., 667 Post Ave., S., Detroit 17, Mich.
Standard Furnace Supply Co., 413-17 S. Tenth St., Omaha 8, Neb.
Standard Heater & Oil Equipment Co., 245 Cornelison Ave., Jersey City 2, N. J.
Standard Machine & Mfg. Co., 8213-15 Gravois Ave., St. Louis 23, Mo.
Standard Oil Co. of California, Bldg. 605, West Olympic Blvd., Los Angeles, Calif.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Standard Pressed Steel Co., Box 810, Jenkintown, Pa.
Standard Reseater Corp., 423 W. 126th St., New York 27, N. Y.
Standard Rolling Mills, Inc., 196 Diamond St., Brooklyn 22, N. Y.
●Standard Stamping & Perforating Co., 3151 W. 49th Pl., Chicago 32, Ill.
Standard Thermometer, Inc., 952 Dorchester Ave., Boston 25, Mass.
Standard Transmission Equipment Co., 78 W. Union St., Pasadena 1, Calif.
Standard Tube Co., 24400 Plymouth Rd., Detroit 28, Mich.
Standard Ventilator Co., Lewisburg, Pa.
Stanley Electric Tools, Div. of The Stanley Works, Myrtle St., New Britain, Conn.
Stanley Works, The, 195 Lake St., New Britain, Conn.
Staples & Pfeiffer, 528 Bryant St., San Francisco 7, Calif.
Sta-Rite Products, Inc., Delavan, Wis.
Star Expansion Bolt Co., 147 Cedar St., New York 6, N. Y.
Star-Kimble Motor Div., Miehle Printing Press & Mfg. Co., 200 Bloomfield Ave., Bloomfield, N. J.
Star Products Co., 130 Walnut Ave., New York 54, N. Y.
Star Tubular Products Co., 4747 S. Richmond St., Chicago, Ill.
Starr Piano Co., Richmond, Ind.
Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
●Stedco Products, 71 Leigh St., Wilkes-Barre, Pa.
Steel City Electric Co., 1201 Columbus Ave., Pittsburgh, Pa.
Steelcote Mfg. Co., 3418 Gratiot St., St. Louis, Mo.
Steel Improvement & Forge Co., 974 E. 64th St., Cleveland 14, O.
Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.
●Stephens-Adamson Mfg. Co., 47 Ridgeway Ave., Aurora, Ill.
Sterling Air Conditioning Corp., 1430 K St., N. W., Washington, D. C.
●Sterling Electric Motors, Inc., 5401 Anaheim Telegraph Rd., Los Angeles 22, Calif.
Sterling Engineering & Mfg. Corp., 114 Business St., Hyde Park 36, Mass.
●Sterling, Inc., 3744 N. Holton St., Milwaukee 12, Wis.
Sterling Radiator Co., Inc., Westfield, Mass.
Stevens Mfg. Co., Inc., Mansfield, O.
Stewart Ice Machine Co., 1282 W. 1st St., Pomona, Calif.
Stewart Mfg. Co., Inc., Grove Ave., Cedar Grove, N. J.
Stewart-Warner Corp., South Wind Div., 1514 Drover St., Indianapolis, Ind.

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Stic-Klip Mfg. Co., 50 Regent St., Cambridge 40, Mass.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis 1, Ind.
Stillwater Clay Products Co., The, 3334 Prospect Ave., Cleveland 15.
Stockham Valves & Fittings Co., Box 2592, Birmingham 2, Ala.
Stokes Machine Co., F. J., 5910 Tabor Rd., Philadelphia 20, Pa.
Stokes Molded Products, Inc., Taylor & Webster. Trenton 4, N. J.
Stout & Sons, David, 7016 Manchester Blvd., St. Louis 17, Mo.
Stover Water Softener Co., 10 State St., St. Charles, Ill.
Stow Mfg. Co., 445 State St., Binghamton, N. Y.
Straight Line Foundry & Machine Corp., Direct Separator Div., The, 218 S. Geddes St., Syracuse 4, N. Y.
Strandwitz & Co., Inc., W. J., Jefferson and Master Sts., Camden, N. J.
Stratford Pipe Scalloper Machine Co., 49 Oakland Pl., Stratford, Conn.
Strong, Carlisle & Hammond Company, 1392 W. Third St., Cleveland 13, O.
Struthers-Dunn, Inc., 150 N. 13th St., Philadelphia 7, Pa.
●Struthers Wells Corp., Titusville, Pa.
Stuart Supply, 417 Ninth St., Des Moines 9, Iowa.
Sturtevant Co., P. A., Addison, Ill.
Sudbury Laboratory, South Sudbury, Mass.
Sulflo, Inc., 1143 E. Jersey St., Elizabeth 4, N. J.
Sumo Pumps, Inc., 1 Atlantic St., Stamford, Conn. Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa.
Sundstrand Machine Tool Co., Hydraulic Div., 2531 11th St., Rockford, Ill.
Sun-Fire Stoker Corp., New Albany, Ind.
Sun-Ray Burner Mfg. Corp., 139-24 Queens Blvd., Jamaica 2, N. Y.
Super Electric Products Corp., 46 Oliver St., Newark, N. J.
Super Mold Corp., 402 N. Sacramento St., Lodi, Calif.
Super Radiator Corp., 6714 Walker St., St. Louis Park, Minneapolis 16, Minn.
●Superior Combustion Industries, Inc., 1475 Broadway, New York 18, N. Y.
Superior Controls Co., Inc., 1835 South Bonnie Brae, Los Angeles 6, Calif.
Superior Steel Corp., Grant Bldg., Pittsburgh 19, Pa.
Superior Tube Co., Norristown, Pa.
Superior Valve and Fittings Co., 1509 W. Liberty Ave., Pittsburgh 26, Pa.
Supreme Air Filter Co., 126 W. 21st St., New York, N. Y.
Supreme Electric Products Corp., 194 Vassar St., Rochester 7, N. Y.
●Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Sutton Corp., O. A., 1812 W. Second St., Wichita 2, Kan.
Swaby Mfg. Co., 3818 W. Armitage Ave., Chicago 47, Ill.
Swaine Mfg. Co., Fred J., 1300 N. Seventh St., St. Louis 6, Mo.
Swallow Airplane Co., Wichita, Kan.
●Swartwout Co., 18511 Euclid Ave., Cleveland 12, O.
Swift Lubricator Co., 19 James Bldg., Elmira, N. Y.
Swift Mfg. Co., Inc., 1455 E. Nine Mile Rd., Hazel Park, Mich.
Syncromatic Corp., Watertown, Wis.
Synchro-Start Products, Inc., 1046 W. Fullerton Ave., Chicago 14, Ill
Syntron Co., Homer City, Pa.

T

T & H Engineering Co., 401 Main St., Little Ferry, N. J.
Taber Pump Co., 272 Elm St., Buffalo 3, N. Y.
●Taco Heaters, Inc., 137 South St., Providence, R. I.
Tagliabue Instruments Div., Weston Electric Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.
Tal Bender, Inc., 417 N. Water St., Milwaukee 2, Wis.
Taller & Cooper, Inc., 75 Front St., Brooklyn 1, N. Y.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., 1001 York St., Indianapolis 7, Ind.
Tamms Industries, Inc., 228 N. LaSalle St., Chicago 1, Ill.
●Taylor Forge & Pipe Wks., P. O. Box 485, Chicago 90, Ill.
●Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y.
Taylor Sons Co., Charles, 710 Burns St., Cincinnati 14, O.
Taylor-Winfield Corp., 1052 Mahoning Ave., N. W., Warren, O.
Technical Ply-Woods, 228 N. LaSalle St., Chicago 1, Ill.
Techniflex Corp., Port Jervis, N. Y.
Techtmann Industries, Inc., 714 W. Wisconsin Ave., Milwaukee 1.
Tecumseh Products Co., Tecumseh, Mich.
Telechron, Inc., Ashland, Mass.
Telsit Insulation Co., 1933 West Farms Rd., Bronx 60, N. Y.
Templeton Bros., 177 Reservation Rd., Hyde Park 36, Mass.
Tempmaster Corp., 1338 McGee St., Kansas City, Mo.
Tempo Products Co., 1900 Euclid Ave., Cleveland 15, O.
Temprite Products Corp., Dept. HPAC, E. Maple Rd., Birmingham, Mich.
Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, P. O. Box 599, Fairfield, Ala.
Tennessee Products and Chemical Corp., American National Bank Bldg., Nashville, Tenn.
Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J.
Terra-Temp Co., Inc., Circle Bldg., Indianapolis 4, Ind.
Terre Haute Boiler Works Co., 1140 Crawford, Terre Haute, Ind.
Terry Steam Turbine Co., The, P. O. Box 1200, Hartford 1, Conn.
Texas Co., The, 135 E. 42nd St., New York 17, N. Y.
Textite Corp., 2110 Roscoe St., Chicago 18, Ill.
Thermac Co., 800 E. 108th St., Los Angeles, Calif.
Thermal Industries, P. O. Box 488, San Francisco 1, Calif.
Thermapanels, Inc., 342 Lincoln Ave., San Jose, Calif.
Thermek Sales Co., P O. Box 268, Whiteater, Wis.
Thermix Corp., The, Greenwich, Conn.
Therm-O-Disc, Inc., 127 Crouse St., Mansfield, O.
Thermoid Co., Trenton, N. J.
Thomas Co., Arthur H., W. Washington Square, Philadelphia, Pa.
Thompson & Co., 1085 Allegheny Ave., Oakmont, Pa.
Thompson & Son Co., The Henry G., 277 Chapel St., New Haven, Conn.
Thompson Research & Mfg. Co., Davenport, Fla.
Thomson Electric Welder Co., 161 Pleasant St., Lynn, Mass.
Thomson Industries, Inc., Manhasset, N. Y.
Thor Tool & Die Co., 865 Estabrook, San Leandro, Calif.
Thread-Ezy Mfg. Co., Corunna, Mich.
Threadwell Tap & Die Co., Greenfield, Mass.
Three Point Industries, 3767 N. Racine Ave., Chicago 13, Ill.
●Thrush & Co., H. A., Peru, Ind.
Thwing-Albert Instrument Co., Penn and Pulaski Ave., Philadelphia 44, Pa.
Tierney Rotor Ventilator Co., 239 Fourth Ave., S., Minneapolis, Minn.
Tiffin Eaves Trough Clamp Co., 25 Miami, Tiffin, O.
Tilco-Fin-Tubing Div., David E. Kennedy, Inc., 58 Second Ave., Brooklyn 15, N. Y.
Timken Roller Bearing Co., 1835 Dueber Ave., S. W., Canton 6, O.
Timken Silent Automatic Div., Timken-Detroit Axle Co., Jackson, Mich.
Tinnerman Products, Inc., P. O. Box 6688, Cleveland 1, O.
Tippett & Wood, Morris and Warren Sts., Phillipsburg, N. J.
Titan Mfg. Co., 701 Seneca St., Buffalo 10, N. Y.
Titchener, E. H. & Co., 67 Clinton St., Binghamton, N. Y.
Titeflex, Inc., 469 Frelinghuysen Ave., Newark 5, N. J.
●Titus Mfg. Corp., 113 E. 8th St., Waterloo, Iowa
●Titusville Iron Wks. Co., The, Titusville, Pa.
Todd Shipyards Corp., Combustion Equipment Div., 81-16-45th Ave., Elmhurst, L. I., N. Y.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo 4, O.
Torit Mfg. Co., 292 Walnut St., St. Paul 2, Minn.
Tork Clock Co., Inc., 1 Grove St., Mt. Vernon, N. Y.
Torq Electric Mfg. Corp., 1006 Interstate St., Bedford, O.
Torrington Co., The, Bantam Bearings Div., South Bend 21, Ind.
Torrington Mfg Co., 70 Franklin St., Torrington, Conn.
Torrington Mfg. Co., The, Western Div., 1000 N. Orange Dr., Los Angeles 38, Calif.
Trade-Wind Motorfans, Inc., 5707 S. Main St., Los Angeles 37, Calif.
Trageser Copper Wks., Inc., 5000 Grand Ave., Maspeth, Long Island, N. Y.
●Trane Co., The, La Crosse, Wis.
Trent, Inc., Leverington Ave. and Wilde St., Philadelphia 27, Pa.
Trent Tube Co., 430 Church St., East Troy, Wis.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit 16, Mich.
Triangle Mfg. Co., 396 Division St., Oshkosh, Wis.
Tri-Clover Machine Co., 2809 60th St., Kenosha, Wis.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., 55-71 Amory St., Roxbury, Boston 19, Mass.
Trimount Instrument Co., 3119 W. Lake St., Chicago 12, Ill.
Trimount Rotary Power Co., 189 Cedar St., Dedham, Mass.
Trindl Products, Ltd., 17 E. 23rd St., Chicago 16, Ill.
Trion, Inc., McKees Rocks, Pa.
Triplex Heating Specialty Co., Inc., 252 N. Grant, Peru, Ind.
Trombetta Solenoid Corp., 329 N. Milwaukee St., Milwaukee 2, Wis.
Tropical Paint & Oil Co., 1244-82 W. 70th St., Cleveland 2, O.
Troy Engine & Machine Co., 20 Railroad Ave., Troy, Pa.
Truetite Corp., The, 36 Union Ave., Bridgeport 7, Conn.
Truflo Fan Co., 523 Main St., Harmony, Pa.
Tru-Line Corp., 1725 Clover Field Blvd., Santa Monica, Calif.
Trumbull Dept., General Electric Co., Woodford Ave., Plainville, Conn.
Truscon Laboratories, Caniff and Trunk R. R., Detroit 11, Mich.
Truscon Steel Co., 1315 Albert St., Youngstown 1, O.
Tryco Products, Inc., Railroad Sq., Westfield, Mass.
●Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.
Tubing Appliance Co., 10321 Anza Ing., Los Angeles, Calif.
Tubing Seal-Cap, Inc., 2810 E. 11th St., Los Angeles 23, Calif.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.
Turner Brass Wks., The, 821-47 Park Ave., Sycamore, Ill.
Tuthill Pump Co., 939 E. 95th St., Chicago 19, Ill.
Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Tweco Products Co., P. O. Box 666, Wichita 1, Kan.
Twin Disc Clutch Co., 1310 Preston St., Rockford 16, Ill.
Typhoon Air Conditioning Co., Inc., 794 Union St., Brooklyn 15, N. Y.

U

[Also see "United States"]

U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles 54.
U. S. Electrical Tool Co., 1050 Findlay St., Cincinnati 14, O.
U. S. Expansion Bolt Co., P. O. Box 827, State St. & P.R.R., York. Pa.
U. S. Machine Corp., Lebanon, Ind.
U. S. Pipe & Mfg. Co., 249 First St., San Francisco 5, Calif.
U. S. Plug & Fitting Co., Wellington, O.
Uehling Instrument Co., 473 Getty Ave., Paterson 3, N. J.
Ultrasonic Corp., 61 Rogers St., Cambridge 42, Mass.
Unexcelled Chemical Corp., 350 5th Ave., New York, N. Y.
Unified Air Conditioner Co., Torry Bldg., Duluth, Minn.
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa.
Unimax Switch Div., W. L. Maxson Corp., 461 W. 34th St., New York 1, N. Y.
●Union Asbestos & Rubber Co., 332 S. Michigan Ave., Chicago 4, Ill.
Union Iron Wks., 1500 Cascade St., Erie, Pa.
Union Malleable Mfg. Co., Ashland, O.
Union Metal Wks., 128 Carter St., Chelsea 50, Mass.
Union Steam Pump Co., Capitol Ave., S. W., Battle Creek, Mich.

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Union Water Meter Co., 333 Hermon St., Worcester, Mass.
●Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill.
Unit Alarm Co., The, P. O. 17 Saratoga Dr., Schenectady, N. Y.
United Chromium, Inc., 100 E. 42nd St., New York 17, N. Y.
United Conditioning Corp., 30 Rockefeller Plaza, New York 20, N. Y.
●United Cooling Tower Co., Porter Bldg., Kansas City 2, Mo.
United Cork Companies, Central Ave., Kearny, N. J.
●United Electric Controls Co., 85 School St., Watertown, Mass.
United Electric Service Co., P. O. Box 119, Wichita Falls, Tex.
United Industries, Box 449, Madison 1, Wis.
United Metal Hose Co., Inc., 36-01 43rd Ave., Long Island City 1, N. Y.

[Also see "U. S."]

●United States Air Conditioning Corp., 33rd & Como Ave., S. E., Minneapolis 14, Minn.
United States Gasket Co., 602 N. 10th St., Camden, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
United States Gypsum Co., 300 W. Adams St., Chicago 6, Ill.
United States Mineral Wool Co., South Milwaukee, Wis.
United States Ozone Co. of America, Crescent St., Scottdale, Pa.
United States Pipe & Foundry Co., Burlington, N. J.
United States Plywood Corp., 55 West 44th St., New York 18, N. Y.
United States Radiator Corp., 300 Buhl Bldg., Detroit 31, Mich.
United States Register Co., Burnham St., Battle Creek, Mich.
United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y.
United States Steel Co., 525 Wm. Penn Place Bldg., Pittsburgh 30, Pa.
●United States Steel Supply Co., 1319 Wabansia St., Chicago, Ill.
United States Stoneware Co., 60 E. 42nd St., New York 17, N. Y.
Universal Convector Corp., 230 Manida St., New York 59, N. Y.
Universal Cooler, Div. of Newport Steel Corp., 299 Joseph St., Marion, O.
Universal-Cyclops Steel Corp., Bridgeville, Pa.
●Universal Diffuser Corp., 890 Whittier St., New York 59, N. Y.
Universal Gypsum & Lime Co., 111 W. Washington St., Chicago, Ill.
Universal Welder Corp., 735 Carnegie Ave., Cleveland 15, O.
Uno Ventilator Co., 1236 Eastern Ave., Malden 48, Mass.
Up-Right Scaffolds, 1013 Pardee St., Berkeley, Calif.
Utica Products, Inc., Utica 4, N. Y.
Utica Radiator Corp., 2201 Dwyer Ave., Utica 2, N. Y.
●Utility Appliance Corp., 4851 S. Alameda St., Los Angeles 58, Calif.
Utility Laboratory, Inc., 330 36th St., Brooklyn 32, N. Y.

V

V. & E. Products, Inc., Schuylkill Haven, Pa.
V-Belt Clutch Co., 418 N. Western Ave., Los Angeles 4, Calif.
Vacuum-Electronic Engineering Co., 756 Third Ave., Brooklyn 32, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vanderman Mfg. Co., Mansfield Ave., Willimantic, Conn.
Van Noorden Co., E., 100 Magazine St., Boston 19, Mass.
Van-Packer Corp., 124 W. Adams St., Chicago 3, Ill.
Vanton Pump Corp., Empire State Bldg., New York 1, N. Y.
Vapofier Corp., 10316 S. Throop St., Chicago 43, Ill.
Vapor Heating Corp., 80 E. Jackson Blvd., Chicago 4, Ill.
Vapor Specialty Co., 101 W. 42nd St., New York 18, N. Y.
Velan Engineering Co., 1 Exchange Pl., Jersey City, N. J.
Velocity Power Tool Co., 7505 Thomas Blvd., Pittsburgh 8, Pa.
Verson Allsteel Press Co., 93rd & Kenwood Ave., Chicago 19, Ill.
Verson Mfg. Co., Holmes St. at Ledbetter Dr., Dallas 8, Tex.
Vibration Eliminator Co., 10-28 47th Ave., Long Island City 1, N. Y.
Victaulic Co. of America, 30 Rockefeller Plaza, New York 20, N. Y.
Victor Electric Products, Inc., 2950 Robertson Rd., Cincinnati 9, O.
Viking Air Conditioning Corp., 5601 Walworth Ave., Cleveland 2, O.
Viking Copper Tube Co., 16700 St. Clair Ave., Cleveland 10, O.
Viking Mfg. Corp., 1747 Chester Ave., Cleveland 14, O.
Viking Pump Co., Fourth and Rouse Sts., Cedar Falls 1, Ia.
Viking Shear Co., 1063 W. 19th St., Erie, Pa.
Vilter Mfg. Co., The, 2148 S. First St., Milwaukee 7, Wis.
Vinco Co., Inc., The, 305 E. 45th St., New York 17, N. Y.
Virginia Smelting Co., West Norfolk, Va.
Vogt Machine Co., Henry, 1000 W. Ormsby St., Louisville 10, Ky.
Voss Co., Inc., J. H. H., 785 E. 144th St., Corner of Wales Ave., New York 54, N. Y.
Vulcan Electric Co., 88-90 Holten St., Danvers, Mass.
●Vulcan Radiator Co., 16 Francis Ave., Hartford 2, Conn.

W

W. G. B. Oil Clarifier, Inc., Kingston, N. Y.
Wabash Mfg. Co., 2318 S. Western Ave., Chicago 8, Ill.
Wachs Co., E. H., The, 1525 N. Dayton St., Chicago 22, Ill.
Wade Mfg. Co., Elgin, Ill.
Wagner Awning & Mfg. Co., 2658 Scranton Rd., Cleveland, O.
●Wagner Electric Corp., 6370 Plymouth Ave., St. Louis 14, Mo.
●Waldron Corp., John, New Brunswick, N. J.
Walker Jamar Co., 365 S. First Ave., E., Duluth, Minn.
Wallace Co., William, Metalbestos Div., Belmont, Calif.
Wallace Supplies Mfg. Co., 1304-12 Diversey Pkwy., Chicago 14, Ill.
Wallace & Tiernan Co., Inc., P. O. Box 178, Newark 1, N. J.
Walsh Co., The, L. M., 755 Boylston St., Boston 16, Mass.
Walsh-Holyoke Steam Boiler Co., Holyoke, Mass.
Walsh Refractories Corp., 101 Ferry St., St. Louis 7, Mo.
Walton Co., Box 5, Elmwood Branch, Hartford 10, Conn.
●Walton Laboratories, Inc., 1186 Grove St., Irvington 11, N. J.
●Walworth Co., 60 E. 42nd St., New York 17, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
●Ward Leonard Electric Co., 24 South St., Mt. Vernon, N. Y.
Ware Coupling & Nipple Co., Ware, Mass.
Warlo Corp., 330 W. 42nd St., New York 18, N. Y.
Warner Lewis Co., 817 N. Lewis Pl., Tulsa, Okla.
Warner Ventilator Co., 225 Spring St., La Grange, Ind.
●Warren Engineering Co., Broadway, N. J.
Warren Foundry & Pipe Corp., 55 Liberty St., New York 5, N. Y.
Warren Refining & Chemical Co., The, 750 Prospect Ave., Cleveland 15, O.
Warren Steam Pump Co., Inc., 300 Bridges Ave., Warren, Mass.
Washburne & Co., E. G., 207 Fulton St., New York, N. Y.
Washington Steel Corp., Griffith Ave., Washington, Pa.
Water Cooling Corp., 71 Nassau St., New York 7, N. Y.
Water Cooling Equipment Corp., New Hampshire Ave. & Weber Rd., Affton Station, St. Louis 23, Mo.
Water Cooling Tower Co., 5501 Cornell Ave., Chicago, Ill.
Water Refining Co., 1123 Barthold, Ft. Wayne, Ind.
Water Service Laboratories, Inc., 423 W. 126th St., New York 27.
Water Tight Underground Conduit, 4220 Ruskin, Houston 5, Tex.
Water Treatment Company of America, 1159 Hodgkiss St., Pittsburgh 12, Pa.
Waterfilm Boilers, Inc., 154 Ogden Ave., Jersey City 7, N. J.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia 23, Pa.
Watson-Standard Co., 225 Galveston Ave., Pittsburgh 30, Pa.
●Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Waukesha Foundry Co., Waukesha, Wis.
Waukesha Motor Co., Waukesha, Wis.
Waverly Heating Supply Co., 31 Union St., Boston 8, Mass.
Wayne Mfg. Co., 1201 E. Lexington St., Pomona, Calif.
Wayne Pump Co., Ft. Wayne 4, Ind.
Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.
Webb Corp., The, Webb City, Mo.
Webb Machine & Tool Co., Imperial, Pa.
Webber Engrg. Corp., 411 Board of Trade Bldg., Indianapolis, Ind.
●Webster & Co., Warren, 1664 Federal St., Camden, N. J.
Webster Electric Co., S. W. Corner Clark & DeKoven Aves., Racine, Wis.
●Webster Engineering Co., P. O. Box 2168, Tulsa 1, Okla.
Wedgeplug Valve Co., Inc., 1300 S. Broad Ave., New Orleans, La.
Wedge Protectors, Inc., 3985 Jennings Rd., Cleveland 9, O.
Weil-McLain Co., Michigan City, Ind.
●Weil Pump Co., 1523 N. Fremont St., Chicago 22, Ill.
Weinman Pump Mfg. Co., The, 290 W. Spruce St., Columbus 8, O.
Weirton Steel Co., Weirton, W. Va.
Weiss & Co., H., 113-115 Mercer St., New York, N. Y.
Weksler Thermometer Corp., 52-56 W. Houston St., New York 12.
Weldex, Inc., 2200 W. Fort St., Detroit, Mich.
Welding Apparatus Co., 2750 W. Van Buren St., Chicago, Ill.
Welding Fittings Corp., New Castle, Pa.
Welsbach Corp., The, Kitson Div., 1500 Walnut St., Philadelphia, Pa.
Welsbach Corp., The, Ozone Processes Div., 1500 Walnut St., Philadelphia 2, Pa.
Welstrom Inc., Fifth St. & North Ford Blvd., Hamilton, O.
Western Blower Co., 1800 Airport Way, Seattle 4, Wash.
Western Brass Mills Div. of Olin Industries, Inc., East Alton, Ill.
Western Chemical Co., 713 Washington St., Kansas City 6, Mo.
●Western Engineering & Mfg. Co., 1726 E. Washington Blvd., Los Angeles 21, Calif.
Western Felt Works, 4029-4117 Ogden Ave., Chicago 23, Ill.
Western Lithograph Co., 600 E. 2nd St., Los Angeles 54, Calif.
Western Mineral Products Co., 1720 Madison St., N. E., Minneapolis 13, Minn.
Western Piping & Engineering Co., 119 Kansas St., San Francisco 3, Calif.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.
Western Thermal Equipment Co., 1701 W. Slauson Ave., Los Angeles 44, Calif.
Western Wire & Iron Works, Inc., 957 W. 18th Pl., Chicago 8, Ill.
Western Wire Products Co., 1415-35 S. 18th St., St. Louis 4, Mo.
Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.
●Westinghouse Electric Corp., Sturtevant Div., Hyde Park, Boston 36, Mass.
Weston Electrical Instrument Corp., 619 Frelinghuysen Ave., Newark, N. J.
●Wheatland Steel Products Co., Bankers Securities Bldg., Philadelphia 7, Pa.
Wheelco Instruments Co., Harrison and Peoria Sts., Chicago 7, Ill.
●Wheeler Mfg. Co., C. H., 1739 Sedgley Ave., Philadelphia 32, Pa.
Wheeling Machine Products Co., Wheeling, W. Va.
Wheeling Steel Corp., Wheeling Steel Corp. Bldg., Wheeling, W. Va.
Whirlaway Motors, Inc., Tipp City, O.
White Flomatic Corp., P. O. Box 267, Hoosick Falls, N. Y.
White & Sons, Inc., Wilfrid O., 178 Atlantic Ave., Boston 10, Mass.
White Mfg. Co., 2362 University Ave., St. Paul 4, Minn.
●White-Rodgers Electric Co., 1209 Cass Ave., St. Louis 6, Mo.
Whiteley Bearing Corp., 1283 S. Ashland Ave., Chicago, Ill.
Whiting Corp., Harvey, Ill.
Whiting Fire Power Products Corp., 1101 John Ave., Superior, Wis.
●Whitlock Mfg. Co., 44 South St., Hartford 10, Conn.
Whitney Chain Co., 237 Hamilton St., Hartford 2, Conn.
Whitney Mfg. Co., W. A., 636 Race St., Rockford, Ill.
Whitney Metal Tool Co.. 110 Forbes St., Rockford, Ill.
Whiton Machine Co., 190 Howard, New London, Conn.
Whittaker Co., Wm. R., 915 N. Citrus, Los Angeles, Calif.

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Whittington Pump & Engineering Corp., 1126 Prospect, Indianapolis 3, Ind.
Whitty Co., Inc., 86 Western Ave., Boston 34, Mass.
Wickes Boiler Co., 502 N. Water St., Saginaw, Mich.
Wickwire Spencer Steel, Div. of Colorado Fuel & Iron Corp., 575 Madison Ave., New York 22, N. Y.
Wiedemann Machine Co., 4272 Wissahickon Ave., Philadelphia 32, Pa.
●Wiegand Co., Edwin L., 7610 Thomas Blvd., Pittsburgh 8, Pa.
Wiggins Oil Tool Co., Inc., E. B., 3424 E. Olympic Blvd., Los Angeles 23, Calif.
Wilbur & Williams Co., 130 Lincoln St., Brighton 35, Mass.
Wilcolator Co., 1001 Newark Ave., Elizabeth B, N. J.
Wilhelm Co., A., 3rd and Bern Sts., Reading, Pa.
Wilkinson Products Co., 3987 Chevy Chase Drive, Pasadena 3, Calif.
Will Corp., 35 Russell St., Rochester 3, N. Y.
Will-Burt Co., The, Orrville, O.
Williams & Co., J. H., Buffalo 7, N. Y.
Williams Co., Inc., B. S., 6 North St., Mt. Vernon, N. Y.
Williams Gauge Co., The, 1620 Pennsylvania Ave., N. S., Pittsburgh 12, Pa.
Williams Oil-O-Matic Div., Eureka Williams Corp., 1201 East Bell, Bloomington, Ill.
Williams & Son, I. B., Dover, N. H.
Williams Valve Co., D. T., Div. of The Schaible Co., 1086 Summer St., Cincinnati 4, O.
Williamson Heater Co., 4558 Marburg Ave., Cincinnati 9, O.
Willis Steel Corp., 156 N. Academy St., Galesburg, Ill.
Willson Products, Inc., 348 Thorn St., Reading, Pa.
Will-Weld Mfg. Co., Inc., 1523 Marcy St., Omaha 2, Nebr.
Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit, Mich.
Wilson & Co., Inc., 4100 S. Ashland Ave., Chicago 9, Ill.
Wilson Co., H. A., The, 105 Chestnut St., Newark, N. J.
Wilson Engineering Corp., 122 S. Michigan Ave., Chicago 3, Ill.
Wilson, Inc., Thomas C., 21-11 44th Ave., Long Island City, N. Y.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York 17, N. Y.
Wind-Way Fan & Ventilator Co., 527 St. Joseph St., New Orleans 2, La.
●Wing Mfg. Co., L. J., 140 Vreeland Mills Rd., Linden, N. J.
Winkler & Sons, Inc., A. E., 2337 N. 31st St., Milwaukee 10, Wis.
Winslow Engineering Co., 4069 Hollis, Oakland 8, Calif.
Wiss & Sons Co., J., 33 Littleton Ave., Newark 7, N. J.
Witte Engine Works, Div. of Oil Well Supply Co., United States Steel Corp., Sub., 1600 Oakland Ave., Kansas City 3, Mo.
Wittenmeier Machinery Co., 850-860 N. Spaulding Ave., Chicago 51, Ill.
Wodack Electric Tool Corp., 4627 W. Huron St., Chicago 44, Ill.
Wolfe-Kote Co., Inc., 820 Penn. Ave.. Sheboygan, Wis.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., 1850 Guardian Bldg., Detroit 26, Mich.
Wood Conversion Co., 1981 First National Bank Bldg., St. Paul 1, Minn.
Wood Co., John, Conshohocken, Pa.
Wood Steel Co., Alan, Conshohocken, Pa.
Wood's Sons Co., T. B., 1275 Fifth Ave., Chambersburg, Pa.
Worner Electronic Devices, Rankin, Ill.
Worthington-Gamon Meter Co., Newark, N. J.
Worthington Pump & Machinery Corp., Dunellen, N. J.
Worthington Pump & Machinery Corp., Harrison & Worthington Sts., Harrison, N. J.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
Wright-Austin Co., 3245 Wight St., Detroit 7, Mich.
Wysong & Miles, 625 Fulton St., Greensboro, N. C.

X

X L Refrigerating Co., 1834 W. 59th St., Chicago 36, Ill.
X Laboratories, Inc., 25 W. 45th St., New York 19, N. Y.
X-Pando Corp., 43-15 36th St., Long Island City 1, N. Y.

Y

Yale & Towne Mfg. Co., Stamford, Conn.
Yardley Plastics Co., 138 Parsons Ave., Columbus 15, O.
●Yarnall-Waring Co., 107 Mermaid Ave., Philadelphia 18, Pa.
●Yates-American Machine Co., Beloit, Wis.
Yeomans Bros. Co., 1471 N. Dayton St., Chicago 22, Ill.
York Corp., Roosevelt Ave., York, Pa.
York Corrugating Co., Adams St. & W. M. R. R., York, Pa.
York Electric & Machine Co., 30-34 N. Penn St., York, Pa.
York-Shipley, Inc., York, Pa.
Yost Mfg. Co., Meadville, Pa.
Young & Bertke Co., 1004-1014 Hulbert Ave., Cincinnati 14, O.
●Young Radiator Co., 709 S. Marquette St., Racine, Wis.
Young Regulator Co., 5209 Euclid Ave., Cleveland 3, O.
●Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown 1, O.
Yula Water Heaters, Inc., 166 W. 225th St., New York, N. Y.

Z

Zaco Laboratories, Div., Zip Abrasive Co., 1360 W. 9th St., Cleveland, O.
Zallea Brothers, Taylor and Locust St., Wilmington 99, Del.
Zeh & Hahnemann Co., 182-200 Vanderpool St., Newark 5, N. J.
Zenith Electric Co., 152 W. Walton St., Chicago 10, Ill.
Zimmerman Packing Co., 2768 Highland Ave., Cincinnati 12, O.
Zink Co., John, P. O. Box 310, Tulsa 1, Okla.
Zone-Heat Regulator Co., Box 188, Garrettsville, O.
Zonolite Co., 135 S. LaSalle St., Chicago 3, Ill.
Zurn Mfg. Co., J. A. Industrial Div., Erie, Pa.

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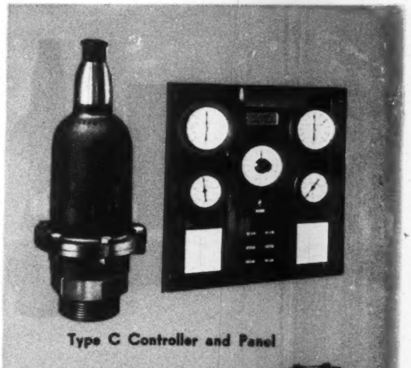
ILLINOIS *Heating System* CONTROLS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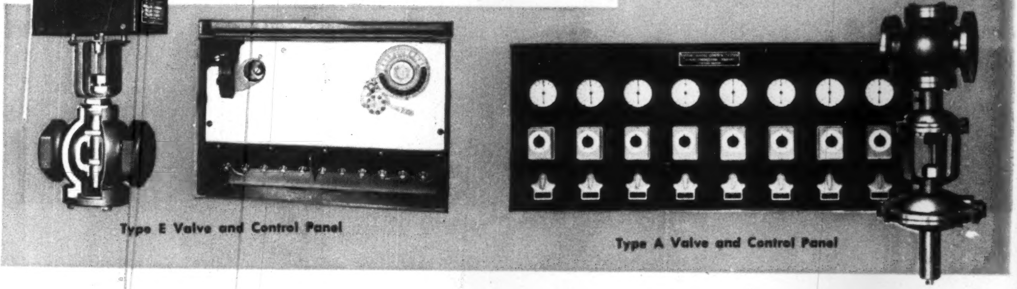
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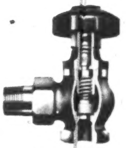
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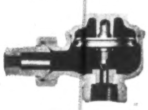
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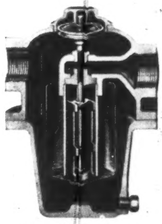
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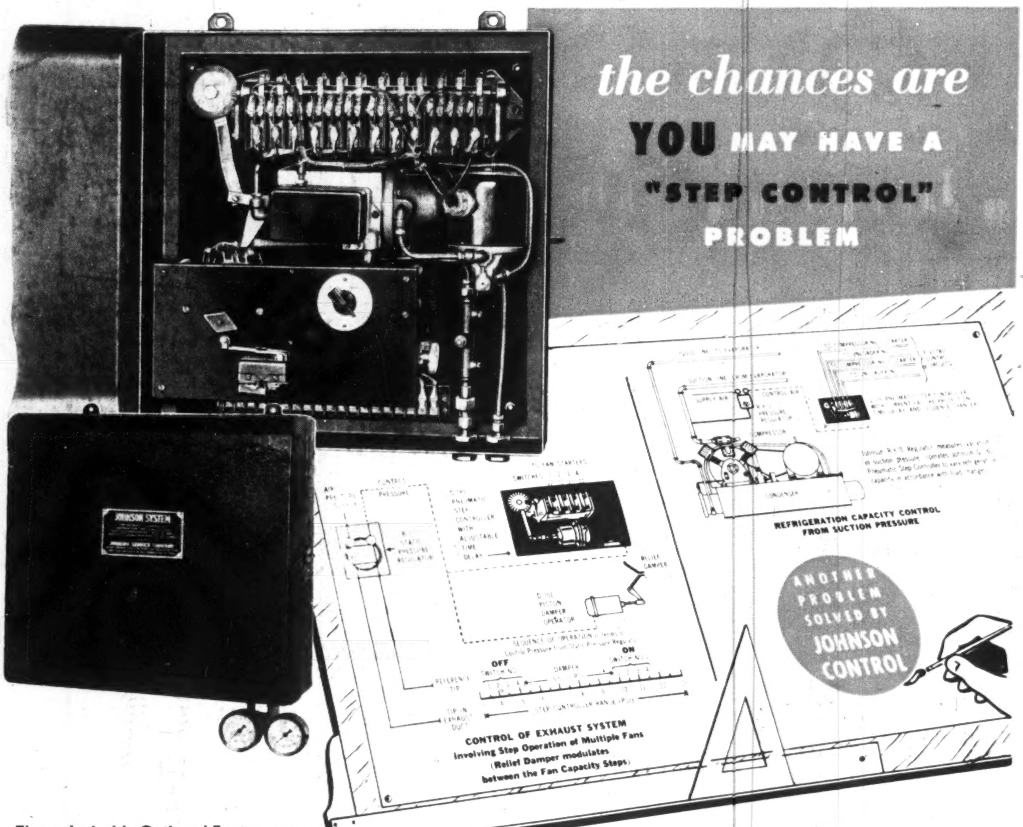
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